Mammotome® Biopsy System

Service Manual

ETHICON ENDO-SURGERY, LLC
a Johnson & Johnson company

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Purpose and Scope

This Service Manual contains information required to troubleshoot, service, and repair the MAMMOTOME® Biopsy System. Assembly drawings, diagrams, and electrical schematics are contained in the document titled MAMMOTOME Biopsy System Assembly Drawings, Diagrams, and Electrical Schematics. Complete operating instructions for the MAMMOTOME Biopsy System, including installation and cleaning instructions, are contained in the MAMMOTOME Biopsy System Operator's Manuals supplied with the system software. The service instructions in this manual are for use only by personnel qualified to repair and service the equipment described in this manual.

Responsibility of the Manufacturer

Ethicon Endo-Surgery, Inc. is responsible for the safety, reliability, and performance of this equipment only if:

- The person installing the device ensures that the installation, inspection, and any required testing are performed in accordance with the instructions in this manual. The inspection shall be documented along with any test results to demonstrate proper installation.
- Persons authorized by Ethicon Endo-Surgery, Inc. carry out any and all service, repair, and upgrade operations.
- The equipment is used in accordance with the MAMMOTOME System Operator's Manual. the MAMMOTOME EX Biopsy System Operator's Manual, and the MAMMOTOME MR Biopsy System Operator's Manual.

Warning: Removing the tamper evident label on the underside of the control module invalidates any warranty provided by Ethicon Endo-Surgery.

Calling for Service

Call 1-800 USE ENDO (U.S. calls), or 1-513-337-8901 (International calls - English speaking only), or contact your local representative. Customer support is also available at customersupport@eesus.jnj.com.

Additional Product Information

For a complete listing and description of available products fo r use with the MAMMOTOME Biopsy System, visit the following website: www.breastcareinfo.com.

System Specifications

Classifications

- Type CF Applied Part
- Class 1
- Mode of Operation: Intermittent operation with a duty cycle of 45 min. "ON" and 15 min. "OFF.
- Safety: Medical Equipment

With respect to electric shock, fire and mechanical hazards only in accordance with UL60601-1, IEC60601-1, CAN/CSAC22.2 No. 601.1, EN 60601-1, and IEC 60601-1-2.

Shipping and Storage

- Temperature: -35ºC to +54ºC
- Humidity: 10% to 100% Relative Humidity, Non-Condensing
- Atmospheric Pressure: 500 hPa to 1,060 hPa

Equipment Operating Conditions

- Temperature: +5ºC to +40ºC
- Humidity: 30% to 75% Relative Humidity, Non-Condensing
- Atmospheric Pressure: 700 hPa to 1,060 hPa

Electrical Specifications

Specification	SCM12	SCM23
Operating Voltage	120V~	220/240V~
Operating Current	6.3 Amps (Maximum)	3 Amps (Maximum)
Operating Frequency	60 Hz	50/60 Hz
Agency Compliance	CF	CF
Patient Isolation (Protection Against Electrical Shock)	USA: UL60601-1 Europe: IEC60601-1, IEC60601-1-2, IEC60601-1-4 Canada: CSA C22.2 No. 601.1	USA: UL60601-1 Europe: IEC60601-1, IEC60601-1-2, IEC60601-1-4 Canada: CSA C22.2 No. 601.1
Operating Temperature	5˚C - 40˚C (41˚F - 104˚F)	5˚C - 40˚C (41˚F - 104˚F)
Operating Humidity	30% to 75% Relative Humidity, Non-Condensing	
Operating Duty Cycle	45 Minutes On, 15 Minutes Off	45 Minutes On, 15 Minutes Off
Fuse Ratings	See **Chapter 4 Repair and Replacement Procedures**.	See **Chapter 4 Repair and Replacement Procedures**.
Degree of Protection Against Ingress of Fluids	System: IPX0 Footswitch: IP68	System: IPX0 Footswitch: IP68

Electromagnetic Compatibility (EMC), Guidance, and Manufacturer Declarations

The MAMMOTOME Biopsy System requires special precautions regarding electromagnetic compatibility (EMC) and must be installed and used in accordance with the EMC information provided in this installation guide. The MAMMOTOME Biopsy System is intended for use in the electromagnetic environments specified below. The installer and user of the system must ensure that the MAMMOTOME Biopsy System is used only in these environments.

Electromagnetic Emissions

Emissions Test	Compliance	Guidance
RF Emissions CISPR 11	Group 1	The MAMMOTOME Biopsy System uses RF energy for its internal functions. Therefore, the system RF emissions are low and are not likely to cause any interference in nearby electronic equipment.
RF Emissions CISPR 11	Class A	The MAMMOTOME Biopsy System is suitable for use in establishments other than domestic and those directly connected to public low-voltage power supply networks.
Harmonic Emissions IEC 61000-3-2	NA	
Voltage Fluctuations/Flicker Emissions IEC 61000-3-3	NA	

Electromagnetic Immunity

Immunity Test	IEC 60601 Test Level	Compliance Level	Guidance
Electrostatic Discharge IEC 61000-4-2	± 6kV Contact ± 8kV Air	± 6kV Contact ± 8kV Air	Relative humidity should be at least 30%.
Radiated RF IEC 61000-4-3	3 Vrms	80 MHz to 2.5 GHz	Portable and mobile RF communications equipment (cell phones) should not be used at close distances.
Electrical fast Transient/Burst IEC 61000-4-4	± 2kV on Power Supply Lines ± 1kV on Input/Output Lines	± 2kV on Power Supply Lines ± 1kV on Input/Output Lines	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	± 1kV Differential Mode ± 2kV Common Mode	± 1kV Differential Mode ± 2kV Common Mode	Mains power quality should be that of a typical commercial or hospital environment.
Conducted RF IEC 61000-4-6	3 Vrms from 150 kHz to 80 MHz 10 Vrms from 80 MHz to 2.5 GHz	3 Vrms from 150 kHz to 80 MHz 10 Vrms from 80 MHz to 2.5 GHz	Portable and mobile RF communications equipment (cell phones) should not be used at close distances.
PowerFrequency Magnetic Fields IEC 61000-4-3	3 A/m	3 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.
Voltage Dips, Short Interrupts, and Variations on Power Supply Lines IEC 61000-4-11	<5% UT (95% dip in UT for 0.5 cycles) <40% UT (60% dip in UT for 5 cycles) <70% UT (30% dip in UT for 25 cycles)	<5% UT (95% dip in UT for 0.5 cycles) <40% UT (60% dip in UT for 5 cycles) <70% UT (30% dip in UT for 25 cycles)	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.

How Supplied

The MAMMOTOME Holster, MAMMOTOME Control Module with SMARTVAC®, MAMMOTOME Footswitch, MAMMOTOME Support Arm, MAMMOTOME Cart, MAMMOTOME Remote Keypad, and MAMMOTOME Software Package are supplied non-sterile. Dispose of these devices and all accessories in accordance with applicable local regulations. For information on material content, contact Ethicon Endo-Surgery, Inc.

Safety Information/Warnings and Precautions

Warning - Risk of Fire

- Replace fuses as marked. Refer to **Chapter 4 Repair and Replacement Procedures** for fuse specifications and location.

Warning - Electric Shock Hazard

- Always disconnect the device from the electrical power source before cleaning or servicing.
- High voltages may be present on surfaces inside the control module. Never touch an exposed conductive surface while the cover is removed and the unit is energized.

Caution - ESD Sensitive Components

- The MAMMOTOME Biopsy System contains components that are sensitive to electrostatic discharge (ESD). Proper ESD precautions must be taken while servicing the MAMMOTOME Biopsy System. A grounded wrist strap must be worn at all times. Repair work must be done at a static controlled workstation. Use an antistatic container for the transport of ESD sensitive circuit boards and components.

Caution - Servicing by Qualified Personnel Only

- To reduce the risk of electric shock, do not remove protective housing. Servicing should be performed by qualified personnel only.

System Component Dimensions

Component	Weight	Size Dimensions
Cart	104 lbs. (47.2 kg)	See **Figure 1-1. Cart Dimensions**
Cart with MR Upgrade and Holster Spool	180.5 lbs. (81.8 kg)	See **Figure 1-1. Cart Dimensions**
Control Module and Screen	58 lbs. (26.3 kg)	See **Figure 1-2. Control Module/Screen Dimensions**
ST Holster and Cables	2.3 lbs. (1.0 kg)	See **Figure 1-3. ST Holster and Cables Dimensions**
ST Probe	.34 lbs. (.16 kg)	See **Figure 1-4. ST Probe Dimensions**
HH Holster	1.6 lbs. (738 g)	See **Figure 1-5. HH Holster Dimensions**
HH Probe	.24 lbs. (110 g)	See **Figure 1-6. HH Probe Dimensions**
EX Holster	.56 lbs. (255 g)	See **Figure 1-7. EX Holster Dimensions**
EX Probe	.28 lbs. (128 g)	See **Figure 1-8. EX Probe Dimensions**
Footswitch	3.8 lbs. (1.7 kg)	See **Figure 1-9. Footswitch Dimensions**
Remote Keypad	.24 lbs. (.11 kg)	See **Figure 1-10. Remote Keypad Dimensions**
MR Probe	.32 lbs. (146 g)	See **Figure 1-11. MR Probe Dimensions**
MR Holster	4.0 lbs. (1.8 kg)	See **Figure 1-12. MR Holster Dimensions**
MR Targeting Set	.16 lbs. (.07 kg)	See **Figure 1-13. MR Targeting Set Dimensions**
MR Interlock System	.55 lbs. (.25 kg)	See **Figure 1-14. MR Interlock System Dimensions**

Cart and MR Cart Upgrade and Holster Spool

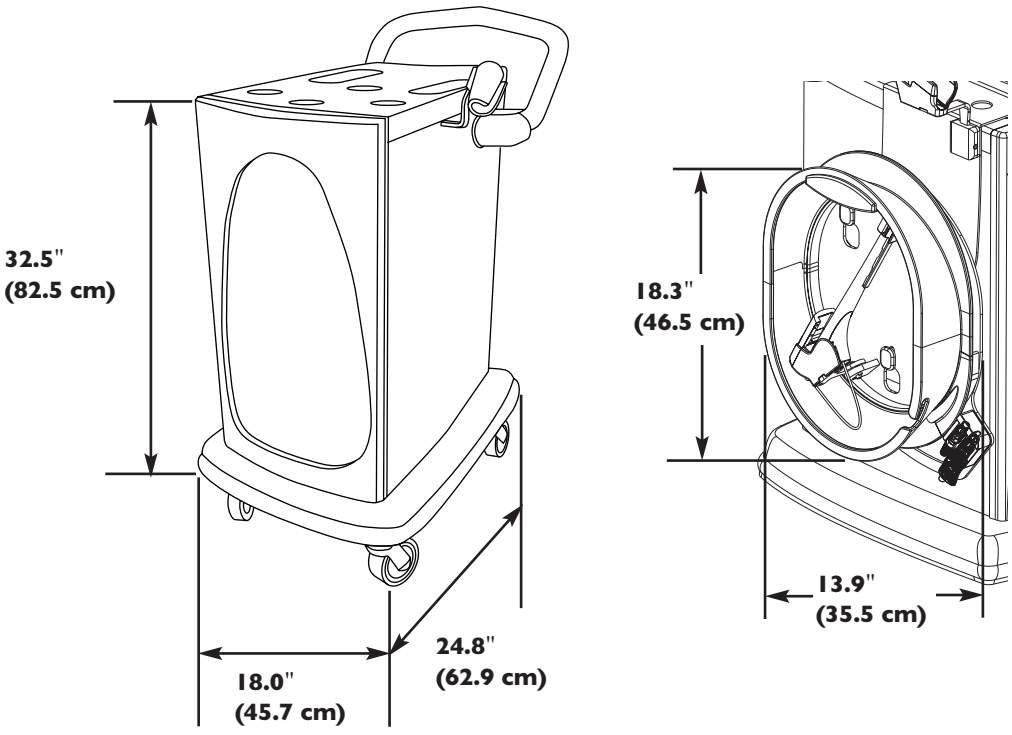

Figure 1-1. Cart Dimensions

Control Module and Screen

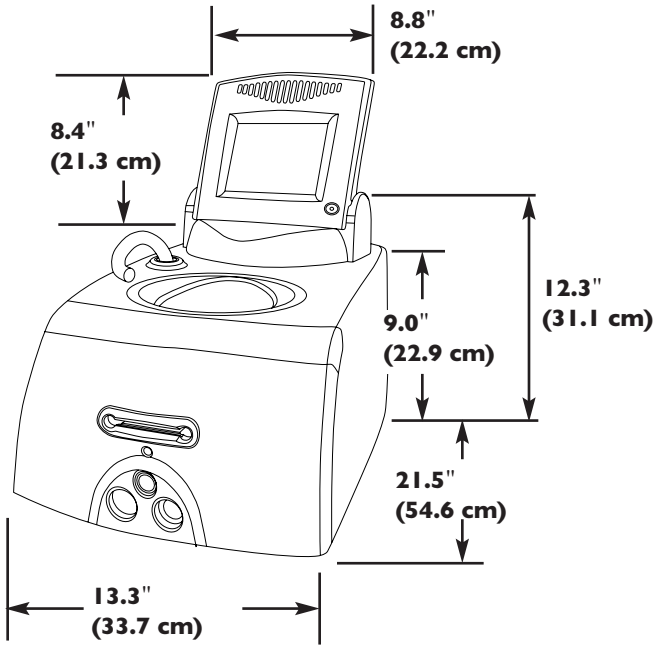

Figure 1-2. Control Module/Screen Dimensions

ST Holster and Cables

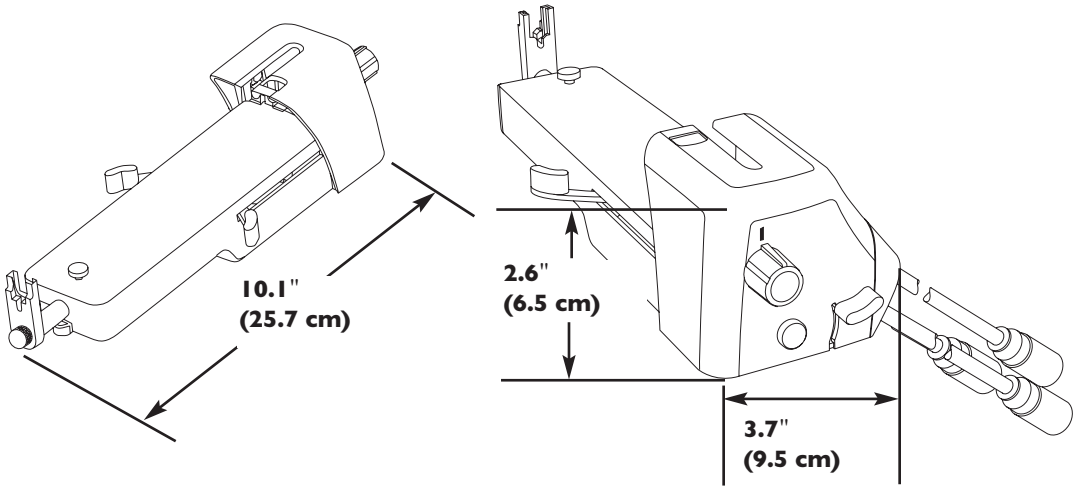

Figure 1-3. ST Holster and Cables Dimensions

ST Probe

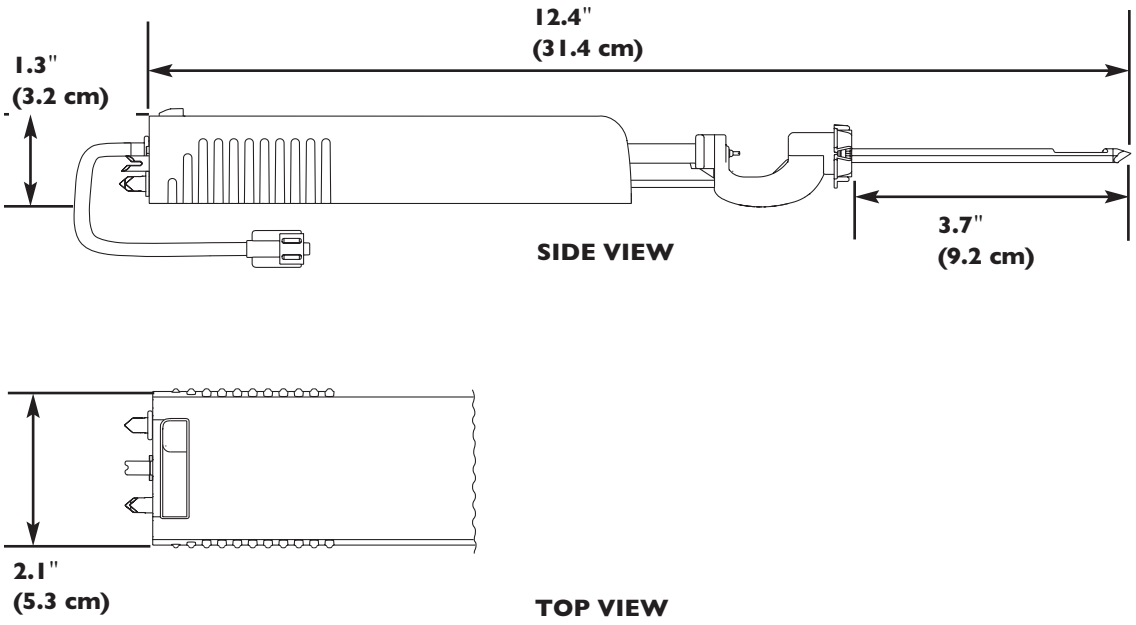

Figure 1-4. ST Probe Dimensions*

* Dimensions may vary by gauge size.

HH Holster and Cables

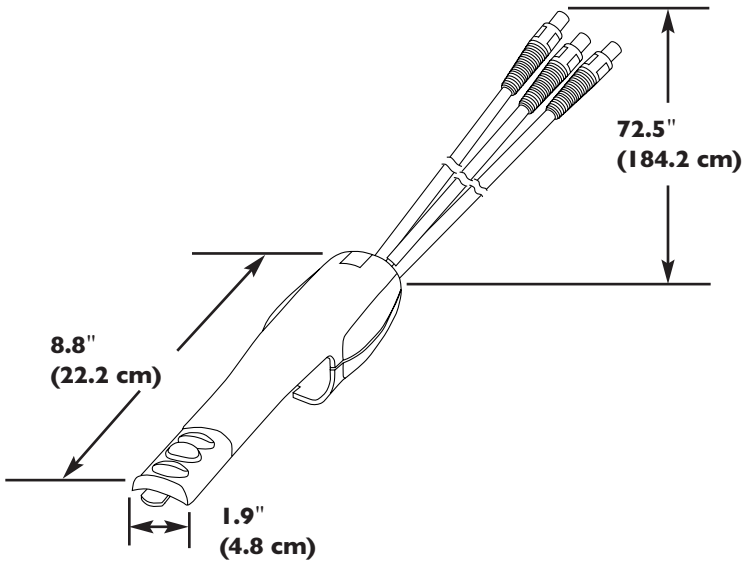

Figure 1-5. HH Holster and Cables Dimensions

HH Probe

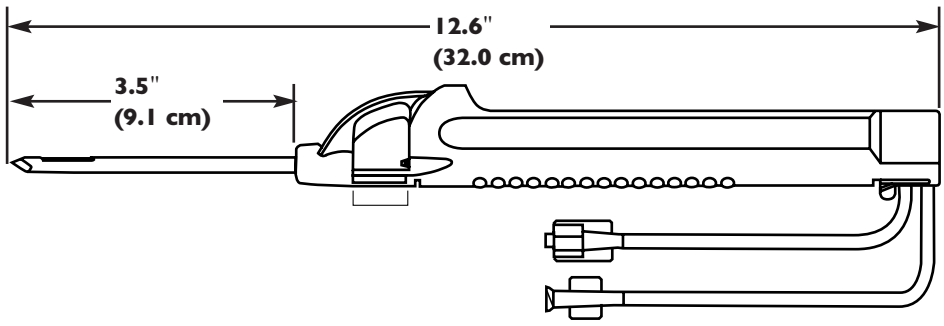

Figure 1-6. HH Probe Dimensions*

* MHH11 (11 GA) probe shown. Dimensions may vary for other probe sizes.

EX Holster

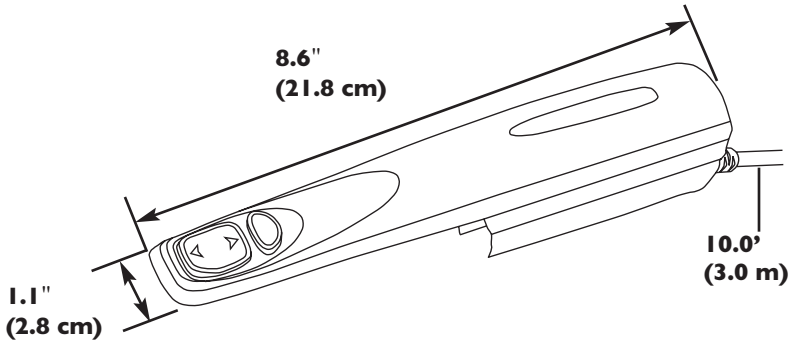

Figure 1-7. EX Holster Dimensions

EX Probe

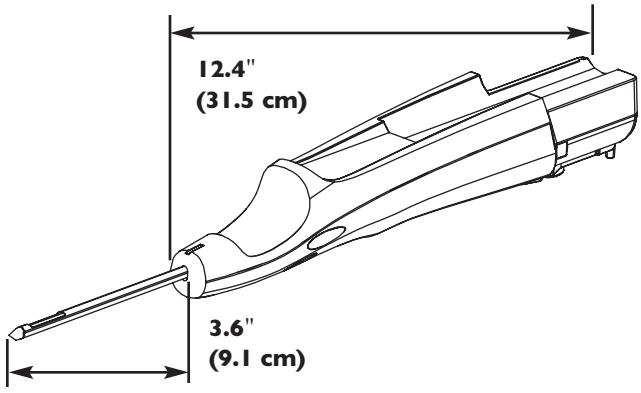

Figure 1-8. EX Probe Dimensions*

* HH11BEX (11 GA) probe shown. Dimensions may vary for other probe sizes.

Footswitch

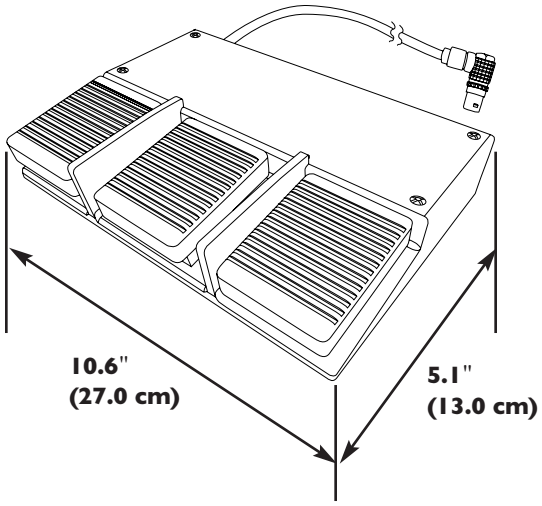

Figure 1-9. Footswitch Dimensions

Remote Keypad

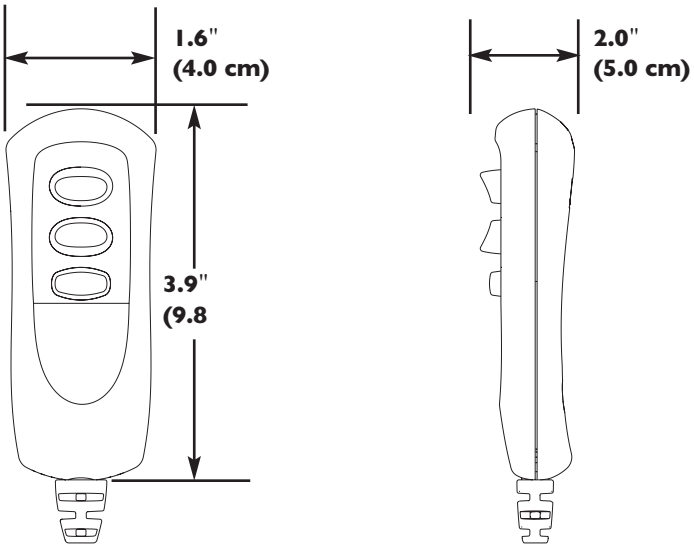

Figure 1-10. Remote Keypad Dimensions

MR Probe

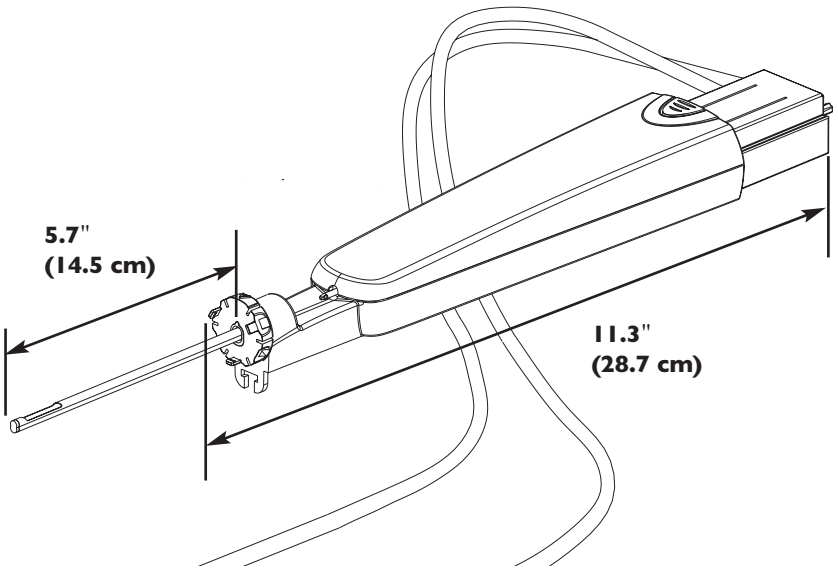

Figure 1-11. MR Probe Dimensions*

* Dimensions given for 145mm length probes.

MR Holster

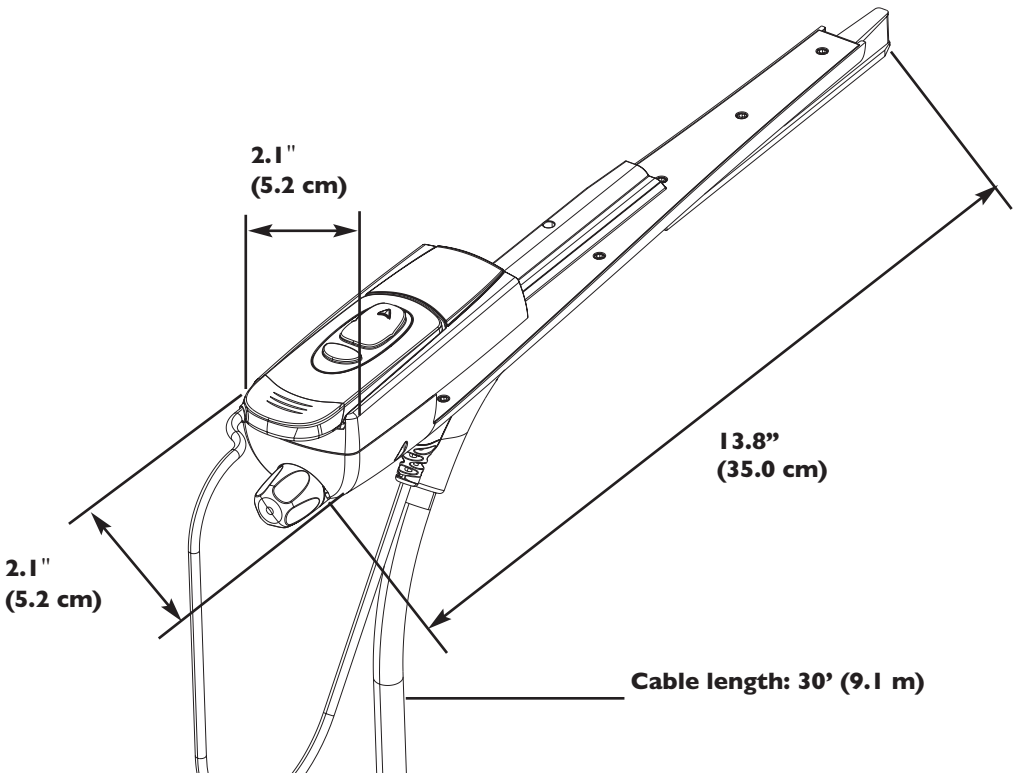

Figure 1-12. MR Holster Dimensions

MR Targeting Set

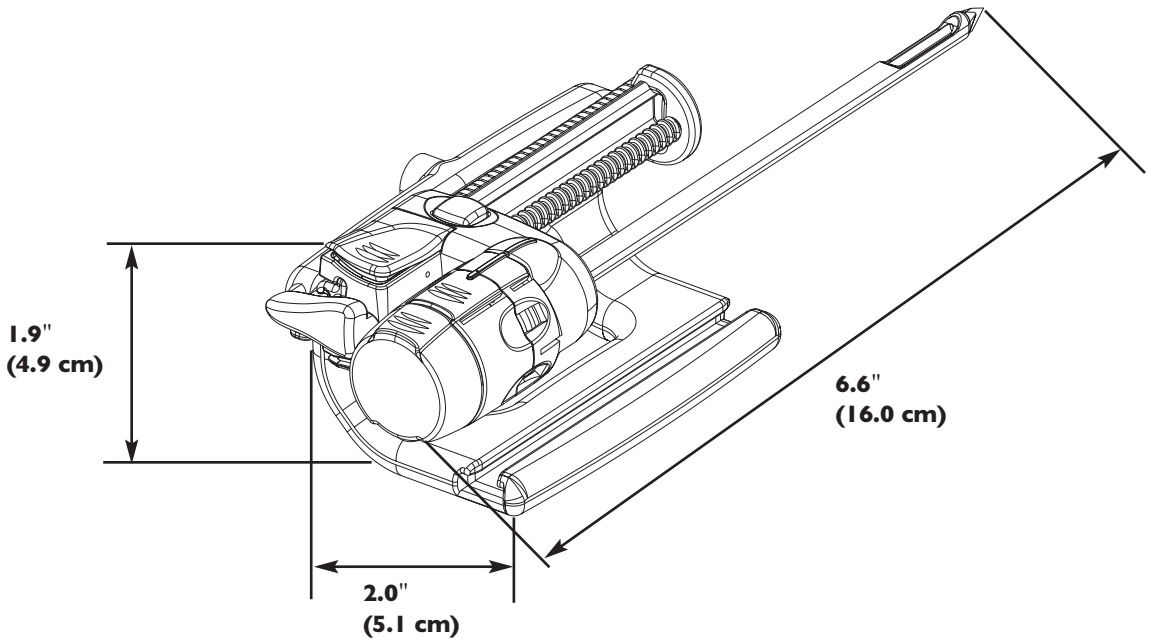

Figure 1-13. MR Targeting Set Dimensions*

* Dimensions given for 145mm length targeting set.

MR Interlock System

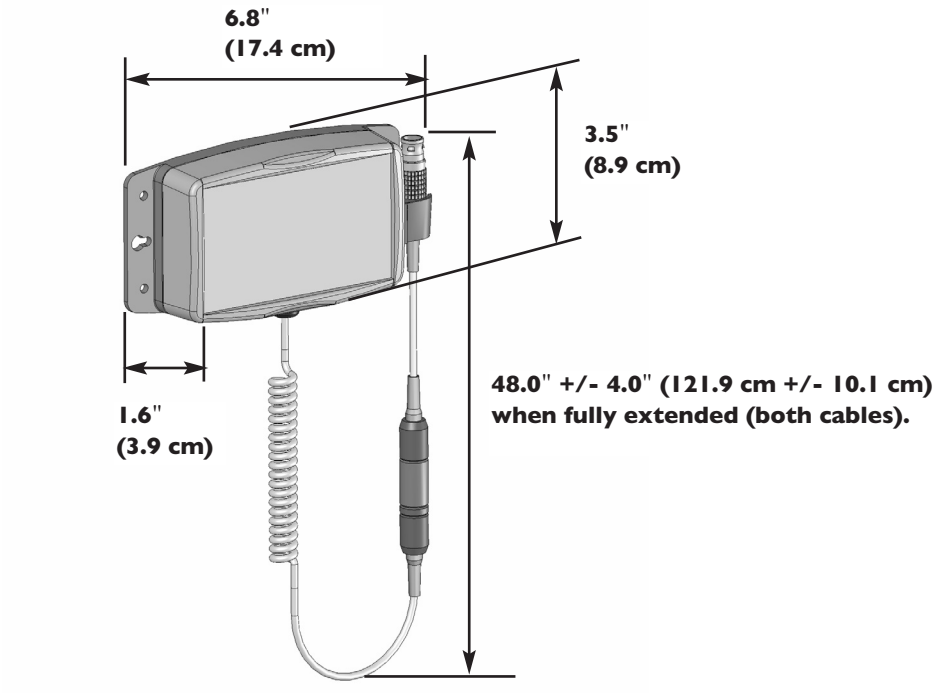

Figure 1-14. MR Interlock System Dimensions*

* Dimensions may vary by gauge size.

Introduction

Chapter 2 Theory of Operation describes the electronic design of the control module, including system layout, board-to-board interfaces, electronic hardware/software interfaces, and detailed hardware design.

Electrical System Design Specifications

The system consists of four (4) printed circuit boards: the uniboard PCB assembly (uniboard), the interface board, the connector board, and the LCD/inverter board. The uniboard contains the main CPU, LCD controller, motor controllers, and motor and solenoid drivers. The interface board contains the motor controllers that drive externally connected motors. The connector board routes signals from the back panel to the uniboard and contains the memory card, remote display, solid-state relay, serial port, and remote control connectors. The LCD/inverter board is located inside the LCD assembly and interfaces with the touchscreen and uniboard.

System Block Diagram

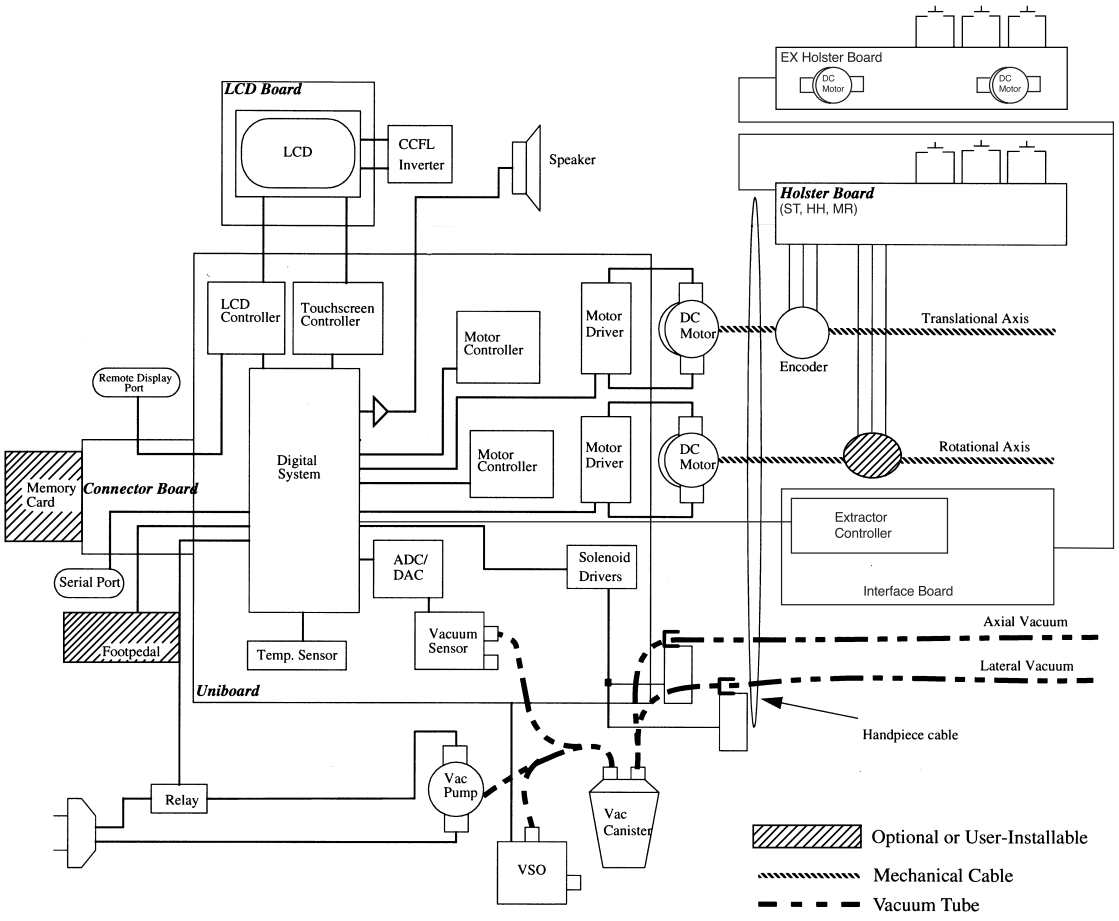

Figure 2-1. System Block Diagram

Uniboard/Interface Board Interface at Interface Board

Pin	Signal Definition	Pin	Signal Definition
1	HGND	9	Holster RX+ (input from holster)
2	+VHLST	10	Holster RX-11
3	+VHLST	11	Holster TX+ (output to holster)
4	HGND	12	Holster TX-13
5	Translational axis holster encoder A+	13	HGND
6	Translational axis holster encoder A-7	14	HGND
7	Translational axis holster encoder B+	15	HGND
8	Translational axis holster encoder B-9	16	HGND

The type of holster connected to the control module determines the following two pin configurations.

Interface Board/EX Holster Interface

Pin	Signal Definition	Pin	Signal Definition
1	HGND	9	Unused
2	+VHLST	10	Unused
3	Holster ID	11	Unused
4	ID Communication Port	12	Unused
5	Translational Motor Drive – CW	13	Unused
6	Translational Motor Drive – CCW	14	Extend Switch- (active low)
7	Rotational Motor Drive – CW	15	Retract Switch- (active low)
8	Rotational Motor Drive - CCW	16	Vacuum Switch- (active low)

Interface Board/ST & HH Holster Interface

Pin	Signal Definition	Pin	Signal Definition
1	HGND	9	Holster RX+ (input from holster)
2	+VHLST	10	Holster RX-11
3	+VHLST	11	Holster TX+ (output to holster)
4	HGND	12	Holster TX-13
5	Translational axis holster encoder A+	13	Rotational axis holster encoder A+
6	Translational axis holster encoder A-7	14	Rotational axis holster encoder A-15
7	Translational axis holster encoder B+	15	Rotational axis holster encoder B+
8	Translational axis holster encoder B-9	16	Rotational axis holster encoder B

Interface Board/MR Holster Interface

Pin	Signal Definition	Pin	Signal Definition
1	HGND	9	Holster RX+ (input from holster)
2	+VHLST	10	Holster RX- (input from holster)
3	+VHLST	11	Holster TX+ (output to holster)
4	HGND	12	Holster TX- (output to holster)
5	Low voltage differential signal A+	13	Unused
6	Low voltage differential signal A-	14	Unused
7	Low voltage differential signal B+	15	Unused
8	Low voltage differential signal B-	16	Unused

Uniboard/Connector Board Interface

The uniboard to connector board interface is a 120-pin board-to-board connector with the following signals.

- 8, UART signals
- 6, footpedal signals
- 10, remote display signals
- 16, data signals for memory card
- 26, address signals for memory card
- 10, control / status signals to / from memory card
- 39, signal grounds (LGND)
- 2, VCC_CARD
- 1, +5V_CTRL
- 1, +5V_FOOT
- 1, relay drive signal

Uniboard/LCD Board Interface

The uniboard to LCD interface consists of two (2) 26-pin connectors: one for the LCD (J6) and one for the inverter, touchscreen, and LED signals (J7).

LCD Connector (J6):

- 20, LCD Control Signals
- 4, signal grounds (LGND)
- 2, +5V_DISP

Inverter/Touchscreen/LED Connector (J7):

- 3, +12V
- 3, signal grounds (LGND)
- 1, LED on/off control signal
- 1, backlight inverter on/off control signal
- 1, backlight inverter brightness control
- 4, touchscreen signals

Note: The 13 signal grounds shown are not routed in the cable. A 13-pin cable is used for the inverter, touchscreen, and LED signals.

Uniboard Definition

The uniboard contains the main CPU, LCD controller, motor controllers, and motor and solenoid drivers. Two PLDs are used for glue logic and memory mapped I/O.

Grounding Scheme

- LGND = digital ground
- A = analog ground
- HGND = holster ground (this is the isolated holster ground)
- PGND = power ground
- VGND = video ground (this is a separate return for the red, green, and blue remote display signals and is tied to LGND near the LCD controller).

Power Distribution

- +5V_ANLG: +5V for sensitive analog circuits.
- +5V_CTRL: +5V for general digital and analog circuits.
- +5V_DISP: +5V for LCD display.
- +5V_FOOT: +5V for footpedal.
- +3.3V_CTRL: +3.3V for digital circuits.
- +12V: +12V for FET drivers and CCFT backlight inverter.
- +48V_FILT: Filtered +48V for motors, solenoids and driver circuitry.
- +VHLST: Holster supply voltage, 6.0V to 7.5V.
- VCC_CARD: Either 3.3V or 5.5V depending on the memory card inserted.

CPU

The CPU is a Motorola Coldfire (5206e) running at 40MHz.

UARTS

- UART 1 = holster
- UART 2 = touchscreen

Interrupts

- irq1 = translational motor controller
- irq4 = rotational motor controller
- irq7 = DUART channel A

Memory

EPROM

The EPROM is a single 4 Mbit (256K x 16) component. The CPU performs 6 wait-state reads to it. A chip select and output enable are the control signals for the EPROM.

System Flash

The Flash ROM consists of four (4) 14 Mbit (2M x 8) components for a total of 8 Mbytes. The CPU performs 5 wait-state reads and 5 wait-state writes. A chip select, write enable, and output enable are the control signals for the Flash ROM.

System DRAM

The system DRAM consists of two (2) 4 Mb x 16 components. The CPU performs 5 clock cycle reads and 5 clock cycle writes. A column, row address strobe, and write enable are the control signals for the system DRAM.

Touchscreen Controller

The touchscreen controller is a PIC microcontroller running at 4 MHz that communicates with the main microcontroller through a UART.

Digital to Analog Converter

There are two digital to analog converters (DACs): a parallel DAC and a I^2C ADC/DAC. The parallel DAC is used in the following manner:

- DACA sets the backlight brightness level.
- DACB sets the translational motor current limit threshold.
- DACC sets the rotational motor current limit threshold.

Component Size Organization Speed (ns)

- EPROM 512 Kbyte 256K x 16 150
- System Flash 8 Mb (expandable to 16M)
- 4 (2M x 8) = 2M x 32 90
- System DRAM 15 Mb 2 (4M x 16) = 4M x 32 50

Analog to Digital Converter

The I^2C ADC/DAC is a Philips, PCF8921AT. The I^2C address is equal to 0 (A2 = 0, A1 = 0, A0 = 1). The I^2C ADC/DAC is used for the following:

- DAC sets the vacuum system regulation value.
- ADC0 reads the vacuum pressure value.
- ADC1 is a spare.
- ADC2 reads the translational motor current.
- ADC3 reads the rotational motor current.

Temperature Sensor

The temperature sensor is a National, LM75CIM-5 I^2C device. The I^2C address is equal to 1 (A2 = 0, A1 = 0, A0 = 1)

LCD and Remote Display

The LCD is a 65640 x 480 TFT display. The remote display port can support standard CRTs with a 15-pin high-density subminiature D-style connector.

Speaker

The speaker is used for error and user interface tones. The National, LM4871 uses a 1W audio amplifier.

Relay

The AC power supplied to the vacuum pump is controlled by a solid-state relay. The relay is controlled by the microcontroller through the PLD.

Serial Port

The serial port allows a PC to communicate with the microprocessor. This consists of a DB-9 connector and standard RS-232 signals.

Footswitch/Remote Keypad

The remote control port allows a footswitch or remote keypad to be used with the control module. The remote control signals are available to the microprocessor through the PLD. Four signals are used for remote control status and two signals are used for remote control identification.

Vacuum Control System

The vacuum is controlled through a closed-loop analog control circuit consisting of a vacuum sensor, DAC, regulation circuitry, and VSO (voltage-sensitive orifice). The vacuum set-point is set by software through the DAC, and the regulating circuitry will maintain the vacuum set-point by adjusting the VSO in a closed-loop fashion. An initial reading determines the zero-vacuum offset of the system. This setting will typically be 250 mV for the Sensym, ASCX30DN sensor (8 bit ADC, 5V reference, 0.01953 V/count). The sensor ratio is 150 mV per PSI, which is equivalent to 73.674 mV per inches of Hg. To determine inches of Hg, subtract the offset value from the ADC reading. Multiply the resulting decimal value by 19.53. Divide that result by 73.764. The result is the vacuum level in inches of Hg.

Internal Motor Control System

One motor drives the cutter rotation and another motor drives the cutter translation. The translational motor controller can receive its feedback either from the encoder in the holster or the encoder attached to the motor itself. The rotational motor controller receives its feedback from the encoder attached to the motor itself.

Internal Motor Drivers

The uniboard contains two motor drivers: one for the translational motor and one for the rotational motor. The rotational motor drive can be controlled “closed-loop” or “open-loop.” In the closed-loop case, the motor driver is controlled with the motor controller by a PWM signal via feedback from one of the encoders attached to the mechanical shaft. In the open-loop case, the rotational motor controller is bypassed and a PWM signal generated by the PLD is sent to the rotational motor driver without encoder feedback.

External Motor Control System

An additional motor control system controls both the cutter translation and rotation through motors attached externally to the control module. Both motors are controlled through a state model which provides a time based sequence for control of both motors.

External Motor Drivers

The interface board contains two motor drivers: one for the translational motor and one for the rotational motor. Both motors are controlled through a closed loop circuitry via a PWM signal generated by the PLD.

Motor Watchdog Circuitry

A motor watchdog stops each motor in the event of a motor driver failure. The PWM signal sent to the motor driver is limited to 97% to guarantee a low pulse every PWM period. This low pulse resets a watchdog counter in the PLD. If the watchdog counter is not reset in 1 ms, a relay is switched to short the motor to stop it, similar to the brake function of the motor driver.

Real-Time Clock

The real-time clock is a Benchmarq bq4842. Before this component is successfully read, it must be written with the current date and time. This action, coupled with the clearing of the oscillator bit, starts the real-time clock and readies the watchdog module for use.

Introduction

Chapter 3 Troubleshooting contains helpful information for identifying and correcting MAMMOTOME System malfunctions. This chapter is divided into two major sections: 1) Error Codes, with associated messages, probable cause(s), and recommended corrective action(s); 2) Hardware Checks, including symptom (failure), probable cause(s), and recommended corrective action(s).

Error Codes

The following section lists the possible error conditions that may occur during operation of the MAMMOTOME System. If the information specified in this section is insufficient, call one of the following numbers for service, and identify the error condition (code) that occurred:

1-800-USE-ENDO (U.S. calls);

1-513-337-8901 (International calls - **English speaking only**).

The Reconnect Holster Screen (Figure 3-1. Reconnect Holster Screen) appears if the holster cables are not properly connected to the control module. If this screen appears, perform the following steps.

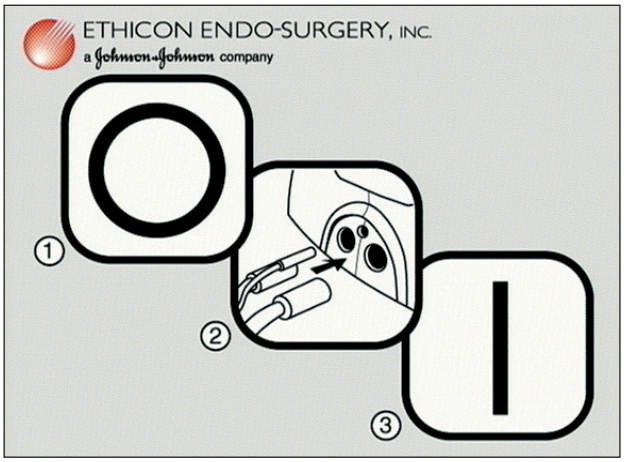

Figure 3-1. Reconnect Holster Screen

1 Switch off (O) the power to the control module.
2 Reconnect the holster cables.
3 Switch on (I) the power to the control module.

The Connect Remote Keypad or Footswitch Screen (Figure 3-2. Connect Remote Keypad or Footswitch Screen) appears only if the remote keypad or footswitch has not been connected to the control module (for ST systems only).

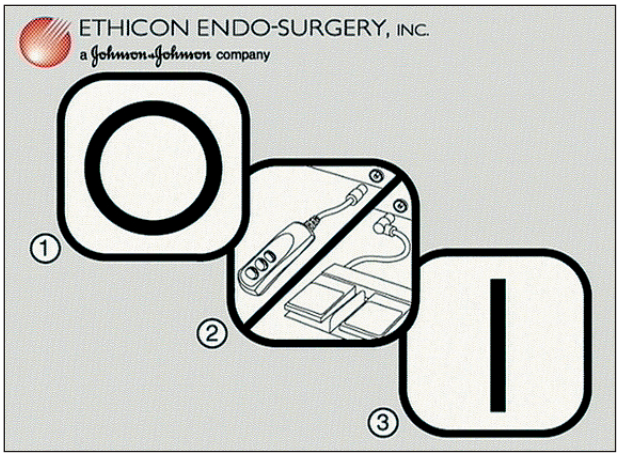

Figure 3-2. Connect Remote Keypad or Footswitch Screen

The appearance of the Incompatible Holster Screen (Figure 3-3. Incompatible Holster Screen) indicates that the holster loaded into the control module is not compatible with the software in the control module. When this message appears, switch the control module off (O), remove the holster, replace it with a compatible holster, and switch on (I) the control module. This screen may vary depending on software version.

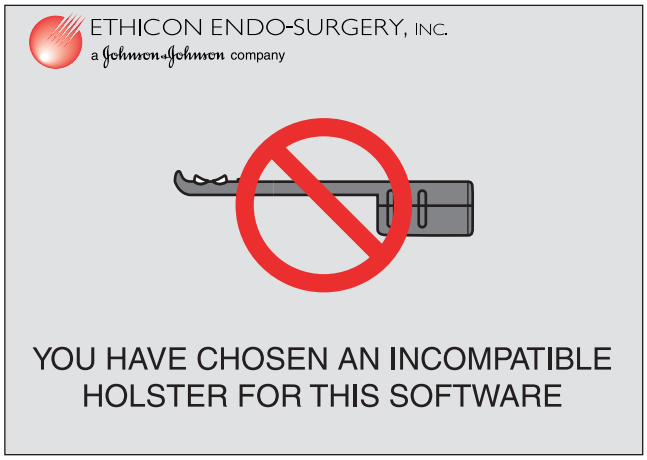

Figure 3-3. Incompatible Holster Screen

Level 1 Error Messages

Level 1 messages are retained in the system event log, but do not appear on the screen.

Error Code	Error Message	Probable Cause	Corrective Action
L1-001	End of Life -- Real Time Clock	Dead battery.	No action.

Level 2 Attention Messages

An L2 attention message appears on the screen for 10 seconds. During this time, the user may press the SERVICE button to make the message disappear. After the 10 second period, the message automatically disappears. The user may proceed under these conditions. The SERVICE button remains on the screen after the attention message has disappeared so the user may recall the attention message. Record the error code (e.g., L2-001) and refer to this section for corrective action.

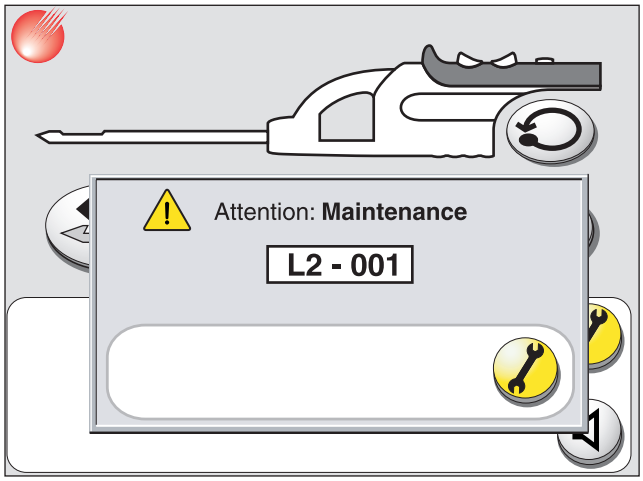

Figure 3-4. Level 2 Attention Screen

Error Code	Error Message	Probable Cause	Corrective Action
L2-001 L2-002	Attention: Maintenance	Product life of holster is diminishing.	Replace used holster with a new holster.

Level 3 Attention Messages

An L3 attention message temporarily suspends the MAMMOTOME System during a procedure. The error message on the screen tells the user specifically what to troubleshoot and repair. Record the error code (e.g., L3-001) and refer to this section of the MAMMOTOME Service Manual for corrective action.

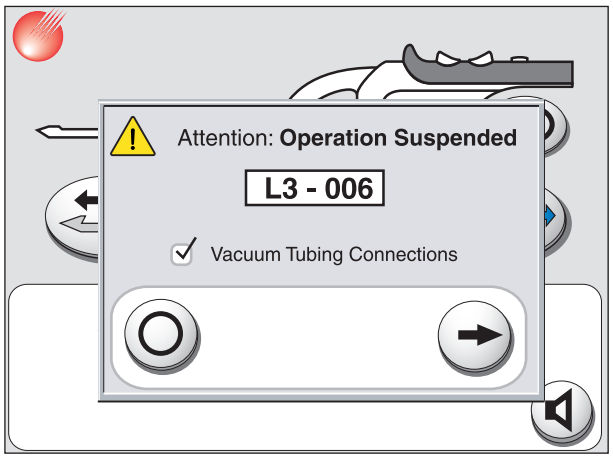

Figure 3-5. Level 3 Attention Screen

Error Code	Error Message	Probable Cause	Corrective Action
L3-001	Probe Connection	Probe is not properly loaded into holster.	Load probe as described in probe package insert. Press → to continue.
L3-002	Wrong Probe	Incorrect probe loaded into holster for desired procedure.	Remove probe and load appropriate probe as described in probe package insert. Press → to continue.
	Adjust Green Holster Cable	Excessive bending of green drive cable.	Straighten green drive cable. Press → to continue.
	Probe Damaged	Multiple causes.	Unload damaged probe and load new probe as described in probe package insert. Press → to continue.
L3-003	Probe Removed	Probe removed from holster mid-procedure.	Reload probe or load new probe as described in probe package insert. Press the EXIT button to reinitialize the probe.
	Adjust Green Holster Cable	Excessive bending of green drive cable.	Straighten green drive cable. Press → to continue.
	Probe Damaged	Multiple causes.	Unload damaged probe and load new probe as described in probe package insert. Press → to continue.

Error Code	Error Message	Probable Cause	Corrective Action
L3-004	Adjust Green Holster Cable	Excessive bending of green drive cable.	Straighten green drive cable. Press → to continue.
	Probe Damaged	Multiple causes.	Unload damaged probe and load new probe as described in probe package insert. Press → to continue.
L3-005	Adjust Blue Holster Cable	Excessive bending of blue drive cable.	Straighten blue drive cable. Press → to continue.
	Probe Damaged	Multiple causes.	Reload probe or load new probe as described in probe package insert. Press the EXIT button to reinitialize the probe.
L3-006	Vacuum Tubing Connections	Vacuum set connection is loose or disconnected.	Check the following vacuum connections for tightness: • Flexible tube connections at canister lid. • Vacuum set cartridge connection. • Canister lid. Press → to continue.
L3-007	Black Holster Cable Disconnected	Black electrical cable connector on holster is not properly connected to control module.	Properly seat black electrical cable connector in control module. Press → to continue.
L3-008	Footswitch Disconnected	Footswitch is not properly connected to control module.	Properly seat footswitch connector in back panel of control module. Press → to continue.
		User no longer wants to use footswitch.	1. Switch off (O) the control module. 2. Disconnect the footswitch from the control module. 3. Connect the remote keypad to the control module. 4. Switch on (I) the control module.
L3-009	Green Holster Cable	Green drive cable connector is not properly connected to control module.	Properly seat green drive cable connector in control module. Press → to continue.
		Green drive cable connected to blue cable connector port.	Connect green and blue connectors to their respective connector ports. Press → to continue.
		Excessive bending of green drive cable.	Straighten green drive cable. Press → to continue.
	Probe Damaged	Multiple causes.	Unload damaged probe and load new probe as described in probe package insert. Press the EXIT button to reinitialize the probe.

Error Code	Error Message	Probable Cause	Corrective Action
L3-010	Remote Keypad FORWARD Button Activated	FORWARD button pressed by accident.	Release FORWARD button. Press → to continue.
L3-011	Remote Keypad REVERSE Button Activated	REVERSE button pressed by accident.	Release REVERSE button. Press → to continue.
L3-012	Remote Keypad VACUUM Button Activated	VACUUM button pressed by accident.	Release VACUUM button. Press → to continue.
L3-013	Footswitch FORWARD Pedal Activated	FORWARD pedal pressed by accident.	Release FORWARD pedal. Press → to continue.
L3-014	Footswitch REVERSE Pedal Activated	REVERSE pedal pressed by accident.	Release REVERSE pedal. Press → to continue.
L3-015	Footswitch VACUUM Pedal Activated	VACUUM pedal pressed by accident.	Release VACUUM pedal. Press → to continue.
L3-016	Incompatible Footswitch or Remote Keypad	Device other than MAMMOTOME Footswitch or Remote Keypad is connected to the control module's remote control socket.	Remove other device connector from the remote control socket and insert MAMMOTOME Footswitch or Remote Keypad connector. Press → to continue.
L3-017	Green Holster Cable	Excessive bending of green drive cable.	Straighten green drive cable. Press → to continue.
		Green drive cable connector is not properly connected to control module.	Properly seat green drive cable connector in control module. Press → to continue.
	Probe Damaged	Multiple causes.	Unload damaged probe and load new probe as described in probe package insert. Press → to continue.
L3-018	Blue Holster Cable	Excessive bending of blue drive cable.	Straighten blue drive cable. Press → to continue.
		Blue drive cable connector is not properly connected to control module.	Properly seat blue drive cable connector in control module. Press → to continue.
	Probe Damaged	Multiple causes.	Unload damaged probe and load new probe as described in probe package insert. Press → to continue.

Error Code	Error Message	Probable Cause	Corrective Action
L3-019	Inadequate Airflow through Unit	Airflow through control module is restricted beneath or at the back panel of the control module.	Remove restrictive material(s) from beneath or behind the control module. Allow sufficient time to cool. Ensure the control module is at least 6" (15.24 cm) from all walls. Press → to continue.
L3-020	Adjust Blue Holster Cable	Excessive bending of blue drive cable.	Straighten blue drive cable. Press → to continue.
	Probe Damaged	Multiple causes.	Reload probe or load new probe as described in probe package insert. Press → to continue.
L3-021	Vacuum Tubing Connections	Vacuum set connection is loose or disconnected.	Check the following vacuum connections for tightness: • Flexible tube connections at canister lid. • Vacuum set cartridge connection. • Canister lid. Press → to continue.
L3-022	Pre-Fire Position	Probe has not been fired.	Release safety lever and press → to continue. Press the fire button on the ST holster.
L3-023	Remote Keypad Disconnected	Remote keypad is not properly connected to control module.	Properly seat remote keypad connector in back panel of the control module. Press → to continue.
		User no longer wants to use remote keypad.	1. Switch off (○) the control module. 2. Disconnect the remote keypad from the control module. 3. Connect the footswitch to the control module. 4. Switch on (|) the control module.

Error Code	Error Message	Probable Cause	Corrective Action
L3-025	Remote Keypad FORWARD Button Activated	FORWARD key pressed unintentionally.	1. Release FORWARD key (button). 2. Press → to continue.
		Defective keypad contacts on EX Holster.	Replace circuit board on EX Holster.
L3-026	Remote Keypad REVERSE Button Activated	REVERSE key pressed unintentionally.	1. Release REVERSE key (button.) 2. Press → to continue.
		Defective keypad contacts on EX Holster.	Replace circuit board on EX Holster.
L3-027	Remote Keypad VACUUM Button Activated	VACUUM key pressed unintentionally.	1. Release VACUUM key (button). 2. Press → to continue.
		Defective keypad contacts on EX Holster.	Replace circuit board on EX Holster.
L3-028	Invalid Translation Move Error	Translation position mismatch between the Uniboard and the Interface board.	Press → to continue. The cutter will automatically retract to position 1.
L3-029	Invalid Rotation Move Error	Rotation position mismatch between the Uniboard and the Interface board.	Press → to continue. The cutter will automatically retract to position 1.

Error Code	Error Message	Probable Cause	Corrective Action
L3-030	Invalid Translation Move Error	Translation position mismatch between the Uniboard and the Interface board.	Press → to continue. The cutter will automatically retract to position 1.
L3-031	Invalid Rotation Move Error	Rotation position mismatch between the Uniboard and the Interface board.	Press → to continue. The cutter will automatically retract to position 1.
L3-032	Probe Damaged	Multiple possible causes: error is attributed to damage to the translation drive train.	Unload damaged probe and load new probe as described in probe package insert. Press → to continue.
L3-033	Probe Damaged	Multiple possible causes: error is attributed to damage to the rotation drive train.	Unload damaged probe and load new probe as described in probe package insert. Press → to continue.

Level 4 Attention Messages

An L4 attention message terminates a procedure and instructs the operator to contact an EES Sales Representative or the Service Center.

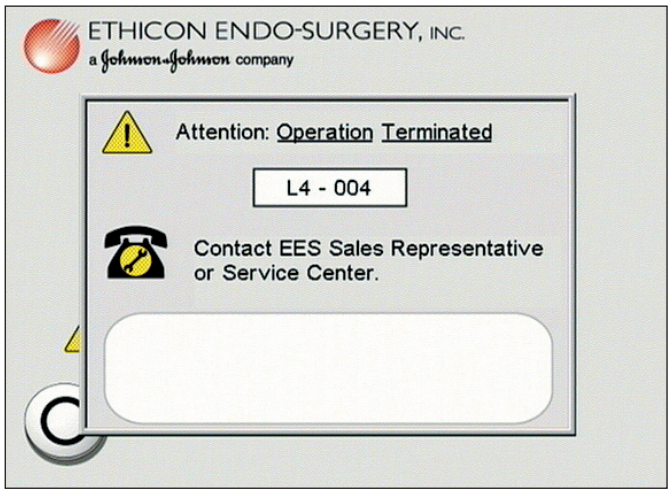

Figure 3-6. Level 4 Attention Screen

Error Code	Error Message	Probable Cause	Corrective Action
L4-002	Flash ROM Integrity Failure	Corrupted ROM.	Reinstall software. See **Software Installation Guide.**
L4-003	Rotation Drivetrain Failure	A failed motor encoder.	Perform Internal Encoder Test. If test fails, see Hardware Checks in this chapter.
L4-004	Translation Drivetrain Failure	A failed motor encoder.	Perform Internal Encoder Test. If test fails, see Hardware Checks in this chapter.
L4-005	Vacuum Sensor Failure (failed high)	A failed VSO. A failed vacuum sensor.	Perform Vacuum/Regulator Test. If test fails, see Hardware Checks in this chapter.
L4-006	Vacuum Sensor Failure (failed low) or Regulator Failure	A failed pump. A failed VSO. A failed vacuum sensor.	Perform Vacuum/Regulator Test. If test fails, see Hardware Checks in this chapter.
L4-007	Uncommanded Movement of Rotation Motor	A failed rotation motor controller or encoder.	Perform Internal Encoder Test. If test fails, see Hardware Checks in this chapter.
L4-008	Uncommanded Movement of Translation Motor	A failed translation motor controller or encoder.	Perform Internal Encoder Test. If test fails, see Hardware Checks in this chapter.
L4-009	Rotation Axis Current Limit Circuitry Failed	A failed control module circuit board.	Perform Excessive Torque Test. If test fails, see Hardware Checks in this chapter.
L4-010	Translation Axis Current Limit Circuitry Failed	A failed control module circuit board.	Perform Excessive Torque Test. If test fails, see Hardware Checks in this chapter.

Error Code	Error Message	Probable Cause	Corrective Action
L4-011	Rotation Axis Motor Driver Monitoring Circuit Failed	A failed control module circuit board.	Replace uniboard PCB assembly. See **Chapter 4 Repair and Replacement Procedures.**
L4-012	Translation Axis Motor Driver Monitoring Circuit Failed	A failed control module circuit board.	Replace uniboard PCB assembly. See **Chapter 4.**
L4-013	Motor Uninitialized	An invalid jump in the software.	Reinstall software. See **Software Installation Guide.** Replace uniboard PCB assembly. See **Chapter 4.**
L4-014	Sequence Fail: Brake Release	An invalid jump in the software.	Reinstall software. See **Software Installation Guide.** Replace uniboard PCB assembly. See **Chapter 4.**
L4-015	Sequence Fail: Brake Set	An invalid jump in the software.	Reinstall software. See **Software Installation Guide.** Replace uniboard PCB assembly. See **Chapter 4.**
L4-016	Safety Variable Corruption	Corrupted RAM.	Reinstall software. See **Software Installation Guide.** Replace uniboard PCB assembly. See **Chapter 4.**
L4-017	Sequence Fail: Position Error	An invalid jump in the software.	Reinstall software. See **Software Installation Guide.** Replace uniboard PCB assembly. See **Chapter 4.**
L4-018	Sequence Fail: Motor Start	An invalid jump in the software.	Reinstall software. See **Software Installation Guide.** Replace uniboard PCB assembly. See **Chapter 4.**
L4-019	Sequence Fail: Motor Stop	An invalid jump in the software.	Reinstall software. See **Software Installation Guide.** Replace uniboard PCB assembly. See **Chapter 4.**
L4-020	Sequence Fail: Current Limit	An invalid jump in the software.	Reinstall software. See **Software Installation Guide.** Replace uniboard PCB assembly. See **Chapter 4.**
L4-021	Sequence Fail: Vacuum	An invalid jump in the software.	Reinstall software. See **Software Installation Guide.** Replace uniboard PCB assembly. See **Chapter 4.**
L4-022	Sequence Fail: Motor PWM Select/Enable	An invalid jump in the software.	Reinstall software. See **Software Installation Guide.** Replace uniboard PCB assembly. See **Chapter 4.**
L4-023	Translational axis motor watchdog expired.	Failed watchdog reset (cycle power on system). Failed motor circuitry.	Cycle system power. Perform Internal Encoder Test. If test fails, see Hardware Checks in this chapter.
L4-024	Rotational axis motor watchdog expired.	Failed watchdog reset (cycle power on system). Failed motor circuitry.	Cycle system power. Perform Internal Encoder Test. If test fails, see Hardware Checks in this chapter.

Error Code	Error Message	Probable Cause	Corrective Action
L4-025	POST ERROR - RAM Failure.	Corrupted RAM in Interface board.	Cycle system power and allow the Interface board to perform a Power On Self Test. Replace the Interface board assembly if the test fails.
L4-026	POST ERROR - CPLD Failure.	Failure in the Complex Programmable Logic Device of the Interface board.	Cycle system power and allow the Interface board to perform a Power On Self Test. Replace the Interface board assembly if the test fails.
L4-027	POST ERROR - ID Chip Failure.	Failure in the ID Chip of the Interface board.	Cycle system power and allow the Interface board to perform a Power On Self Test. Replace the Interface board assembly if the test fails.
L4-028	Programming Checksum Error.	An invalid jump in the software on the Interface board.	Cycle system power and allow the Interface board to perform a Power On Self Test. Replace the Interface board assembly if the test fails.
L4-029	Programming Block Sequence Compromised.	An invalid jump in the software on the Interface board.	Cycle system power and allow the Interface board to perform a Power On Self Test. Replace the Interface board assembly if the test fails.
L4-030	Programming Aborted Prematurely.	An invalid jump in the software on the Interface board.	Cycle system power and allow the Interface board to perform a Power On Self Test. Replace the Interface board assembly if the test fails.
L4-031	Translation Motor Failure.	A failed translation motor chip on the Interface board.	Cycle system power and allow the Interface board to perform a Power On Self Test. Replace the Interface board assembly if the test fails.
L4-032	Rotation Motor Failure.	A failed rotation motor chip on the Interface board.	Cycle system power and allow the Interface board to perform a Power On Self Test. Replace the Interface board assembly if the test fails.
L4-033	Management Software and Interface Board Software Communication Failure.	A failure in the signal path between the Uniboard and the Interface board.	Cycle system power and allow the Interface board to perform a Power On Self Test. Inspect the wiring harness for continuity (Uniboard to Interface board).
L4-034	Control modulel Application software and Interface Board Software Communication Failure.	A failure in the signal path between the Uniboard and the Interface board.	Cycle system power and allow the Interface board to perform a Power On Self Test. Inspect the wiring harness for continuity (Uniboard to Interface board).

Hardware Checks

Symptom	Probable Cause	Corrective Action
The control module will not power on.	Control module is not connected to an electrical source.	Make sure the power cord is properly connected to the back of the control module and to a grounded electrical outlet.
	Voltage of the control module is inappropriate for the electrical system being used.	Verify the voltage of the control module is appropriate for the electrical system being used. A product information label on the back of the control module lists the product code and electrical specifications. See **Chapter 1 System Overview** for electrical specifications.
	Mains power fuse is open.	Check the two Mains fuses and replace if necessary as described in **Chapter 4.**
	Power supply fuse is open.	Check the two power supply fuses and replace if necessary as described in **Chapter 4**.
After turning the control module on, the screen is blank, the green LED is not illuminated, but the cooling fan is running.	Uniboard PCB fuse is open.	Check the two uniboard PCB assembly fuses and replace if necessary as described in **Chapter 4**.
	Uniboard/LCD cable not properly connected.	Ensure proper connection of cable or replace as necessary.
	Defective uniboard PCB assembly.	Replace the uniboard PCB assembly as described in **Chapter 4**.

Symptom	Probable Cause	Corrective Action
The control module experiences excessive vibration and/or noise during operation of the vacuum pump.	Control module is not secured to the top of the cart.	Ensure the control module is correctly and completely secured to the top of the cart.
	Vacuum set connections are loose.	Check all the connections of the vacuum set to ensure tightness. A leak in the vacuum system may lead to excess vibration during pump operation.
	The top housing of the control module is not properly fastened.	Ensure that all of the screws for the housing are in place and properly tightened. Check for any damage to the housing.
	The pump is not properly mounted.	Verify that the (4) 1/4 - 20 x 1 1/2" screws mounting the pump are tight and set to a torque of 120 $\pm$ 5" lbs. Also ensure that the pump constraint covers on the bottom of the control module are properly seated and torque is set to 14 $\pm$ 1 in.-lbs.
	The pump muffler is loose.	Check that the pump muffler is properly oriented and set to correct torque.
	Defective vacuum pump.	Replace the pump. See **Chapter 4.**
Screen will not tilt.	Screen is being adjusted incorrectly.	Adjust the screen using the screen handle located behind the screen.
Screen will not stay upright.	Damage to the screen tilt locking mechanism.	Replace the locking pin.
Screen will not rotate.	Screen has been fully rotated in one direction.	Rotate the screen in the opposite direction.
Screen rotates over 350˚.	Rotation stop tabs broken.	Replace the top cover.
The vacuum set cartridge cannot be removed from the vacuum connection slot on the front of the control module.	Locking tab is not being pressed.	Press down on the locking tab of the vacuum set cartridge, and pull out to remove from the control module.

Symptom	Probable Cause	Corrective Action
The remote keypad does not respond when the buttons are pressed.	Remote keypad is not properly connected to the control module.	1. Switch off (O) the control module. 2. Properly connect the remote keypad to the control module. 3. Switch on (I) the control module.
	Remote keypad was working but the cable became disconnected from the control module.	Make sure the cable of the remote keypad is properly connected to the control module. Connect the remote keypad cable. If the problem persists, power the control module off (O) and reconnect the remote keypad.
	Remote keypad was not connected to the control module when the control module was turned on.	1. Switch off (O) the control module. 2. Properly connect the remote keypad to the control module. 3. Switch on (I) the control module.
The footswitch does not respond when the foot pedals are pressed.	Footswitch cable is not properly connected to the control module.	1. Switch off (O) the control module. 2. Properly connect the footswitch to the control module. 3. Switch on (I) the control module.
	Footswitch was working but the cable became disconnected from the control module.	Make sure the cable of the footswitch is properly connected to the control module. Connect the footswitch cable. If the problem persists, turn the control module off to reconnect the footswitch.
	A short exists in the cable.	Jiggle the cable or try another footswitch to reproduce the error and replace the footswitch if necessary.
Support arm moves when the holster cables are adjusted.	Clamp is not tight enough.	Tighten the clamp by turning the clamp knob clockwise.
Connections of flexible arm seem loose.	Quick connectors are not fastened correctly.	Disconnect quick connectors and reconnect.
The probe will not lock into the holster.	Foreign material is lodged in the holster cavity or blocking the holes in the probe body slot.	1. Unload the probe. 2. Check for foreign material. 3. Reload the probe.
	One of the Procedure Screens is active.	Switch the control module (O) off, or navigate to the Probe Selection Screen and reload the probe.
	Rotation knob is not aligned with 12 o'clock position of the probe (ST only).	Align the rotation knob with the 12 o'clock position of the ST probe.
	Probe housing slot is not properly seated into the firing fork.	1. Unload the probe. 2. Make sure the firing fork and the fork screw are completely installed.

Symptom	Probable Cause	Corrective Action
The control module does not provide any "signals" or "beeps" when the buttons on the holster are pressed.	Footswitch is connected to the control module.	1. Switch off (O) the control module. 2. Disconnect the footswitch from the control module. 3. Connect the holster to the control module. 4. Switch on (I) the control module.
	Control module volume is turned down.	At the Procedure Screen, increase the volume of the control module
	Electrical cable is loose or not connected properly.	Make sure the electrical cable is securely seated in the connector port on the front of the control module.
The Reconnect Holster Screen appears on the control module.	Cables are not properly connected to the control module.	Switch off (O) the control module and reconnect the cables.
ST Probe cannot be removed from holster.	Cutter is within the sample notch.	Retract the cutter proximal to the sample notch.
Cart wheels will not move.	Front wheels are locked.	Unlock the cart wheels.

L3 Attention Screens for MR Systems

An L3 attention message temporarily suspends the MAMMOTOME System during a procedure. The error message on the screen tells the user specifically what to look for in order to rectify the situation and continue with the procedure. Record the code (e.g., L3-006) and refer to this section for the appropriate corrective action.

Code	Message	Possible Cause	Corrective Action
L3-002	Probe Damaged	Multiple possibilities.	1. Unload damaged probe. 2. Load new probe 3. Press fi to continue. 4. Select NEW PROBE at the YOU HAVE EXITED THE PROCEDURE screen.
L3-006	Vacuum Tubing Connections	Vacuum set connection is loose or disconnected.	1. Check the following vacuum connections for tightness: • Flexible tube connections at canister lid. • Vacuum set cartridge connection. • Canister lid. 2. Press ⇒ to continue.
L3-007	Holster Cable Disconnected	The holster is not properly connected to control module.	1. Properly seat holster cable connector in control module. 2. Press ⇒ to continue.
L3-010	Holster FORWARD Button Activated	FORWARD key (button) pressed unintentionally.	1. Release FORWARD key (button) on holster. 2. Press ⇒ to continue.

Code	Message	Possible Cause	Corrective Action
L3-011	Holster REVERSE Button Activated	REVERSE key (button) pressed unintentionally.	1. Release REVERSE key (button). 2. Press ⇒ to continue.
L3-012	Holster VACUUM Button Activated	VACUUM key (button) pressed unintentionally.	1. Release VACUUM key (button). 2. Press ⇒ to continue.
L3-019	Inadequate Airflow Through Unit	Airflow through control module is restricted beneath or at the back panel of the control module.	1. Remove restrictive material(s) from beneath or behind the control module. 2. Allow sufficient time for the control module to cool. 3. Ensure that the control module is at leat 6" (15.24 cm) from all walls. 4. Press ⇒ to continue.
L3-021	Vacuum Tubing Connections	Vacuum set connection is loose or disconnected.	1. Check the following vacuum connections for tightness: • Flexible tube connections at canister lid. • Vacuum set cartridge connection. • Canister lid. 2. Press ⇒ to continue.
L3-040	Low Speed Position Error While Homing	Tight loops in mechanical drive cable.	Loosen or straighten cable.
L3-041	High Speed Position Error While Homing	Tight loops in mechanical drive cable.	Loosen or straighten cable.
L3-042	Low Speed Position Error While in Position, Sample, or Clear Probe Mode	Object lodged in probe aperture. Damaged probe.	Dislodge object. Replace probe.
L3-043	High Speed Position Error While in Position, Sample, or Clear Probe Mode	Object lodged in sample retrieval area. Damaged probe.	Dislodge object. Replace probe.

Code	Message	Possible Cause	Corrective Action
L3-044	Non MRI safe input device connected to control module.	One of the following is connected to control module: EX holster, ST holster, HH holster, remote keypad, footswitch.	Replace incorrect holster with MR holster; remove footswitch or remote keypad from ILB connection located on the back of the control module.
L3-045	Interlock box not connected.	Interlock box not connected to control module.	Connect interlock box to back of control module.

System Checks for MR Systems

Symptom	Possible Cause	Corrective Action
The control module will not power on.	Control module is not connected to an electrical source.	Ensure that the power cord is properly connected to the electrical socket on the back panel of the control module and to a grounded electrical outlet.
	Incompatible voltage.	Verify that the voltage of the control module is appropriate for the electrical system in use. A product information label on the back of the control module lists the product code and electrical specifications.
	Internal malfunction.	Contact an EES sales representative or service center for service.
The control module experiences excessive vibration during operation of the vacuum pump.	Control module is not secured to the top of the cart.	Ensure that the control module is correctly and completely secured to the top of the cart.
	Vacuum set connections are loose.	Check all the connections of the vacuum set to ensure tightness. A leak in the vacuum system may lead to excess vibration during vacuum pump operation.
	Internal malfunction.	Contact an EES sales representative or service center for service.
The screen will not tilt.	Incorrect screen adjustment.	Adjust the screen using the screen handle located behind the screen.
The screen will not rotate.	Screen has been fully rotated in one direction.	Rotate the screen in the opposite direction.
Cannot remove vacuum set cartridge from vacuum connection slot on front of control module.	Vacuum set cartridge will not disengage from control module.	Press down on the locking tab of the vacuum set cartridge and pull out to remove from control module.

Symptom	Possible Cause	Corrective Action
Cart wheels will not move.	Front wheels are locked.	Unlock the cart wheels.
The probe will not lock into the holster.	Foreign material is lodged in the holster base or blocking the holes in the probe base.	Unload the probe, check for foreign material, and reload the probe.
	Defective probe.	Replace probe.
The control module does not provide any “signals” or “beeps” when the buttons on the holster are pressed.	Control module volume is too low.	At the Volume and Vacuum Settings toolbar pop-up screen, increase the control module volume.
The holster keypad does not respond when the keys are pressed.	Faulty cable.	Replace keypad cable.

Targeting Set Troubleshooting for MR Systems

Symptom	Possible Cause	Corrective Action
Cradle locking tab does not securely hold the cradle in place with the z-rail.	Cradle not seated properly.	Reseat cradle, ensuring that a clicking sound is heard to indicate that it has locked.
	Cradle locking tab broken.	Replace cradle.
The handle on the z-screw is defeated, or the handle breaks.	The lever is not oriented toward the pillar, and deflects past the stop or breaks the handle.	Make certain that the z-screw handle is facing the pedestal prior to inserting into the patient. replace the targeting set if the z-screw handle is broken.
The seal is torn.	A sharp object such as the blade cuts or tears the seal.	Minimize potential damage to the seals by inserting the obturator coaxially through the thumbwheel.
One or more of the targeting set components is damaged or missing.	Multiple possibilities.	Replace targeting set.

Symptom	Possible Cause	Corrective Action
The thumbwheel does not show the rotational position of the aperture.	The obturator and/or probe are inserted 180 degrees incorrectly during imaging; no sample is retrieved during biopsy.	When properly installed, the probe and obturator should insert into the targeting thumbwheel in a singular, unique orientation. Reinstall, ensuring that the probe and obturator seat and latch with the thumbwheel.
The levers fail to hold the sleeve mount in position on the targeting rail.	Improper aperture position during imaging. Z-screw interferes with bore of magnet.	If the levers are defeated and the sleeve mount moves back, and the buttons have not been activated, confirm the correct orientation of the z-screw lever and push the targeting back in until the z-stop bottoms again.
Targeting rail fails to release.	Interference between targeting set and rail.	Use the localization compression rails to remove the targeting. Release the angulation control to ensure perpendicular retraction of the targeting.
The thumbwheel does not rotate freely on the sleeve mount.	The fit of the targeting set components is too tight.	If the thumbwheel does not rotate freely, replace targeting set.
The levers jam and do not release the sleeve assembly for adjustment.	The fit between the levers and the sleeve mount is too tight.	If the sleeve mount cannot be pulled away from the patient by depressing the levers, the pawl can be rotated back and depressed to release the targeting rail.
The buttons jam closed in the sleeve mount, and the z-screw cannot be adjusted except by rotation.	The fit between the buttons and the sleeve mount is too tight.	If the buttons fail to move, rotate the z-screw until the buttons move. If the buttons still fail to move, replace targeting set.
The secondary z-rail slides off of the primary rail, interfering with the bore of the magnet.	Spring is displaced.	Before sliding the patient into the magnet, always confirm that the patient and targeting have clearance with respect to the magnet bore.

Event and Usage Log Reviews

The Event Log and Usage Log record system events and data for use in troubleshooting. When calling for service, the call center representative may require information from the Event and Usage Logs. This section explains how to access information from the Event and Usage Log Review screens.

At the Physician Selection screen, select the **Event Log** button to display the Event Log Review screen.

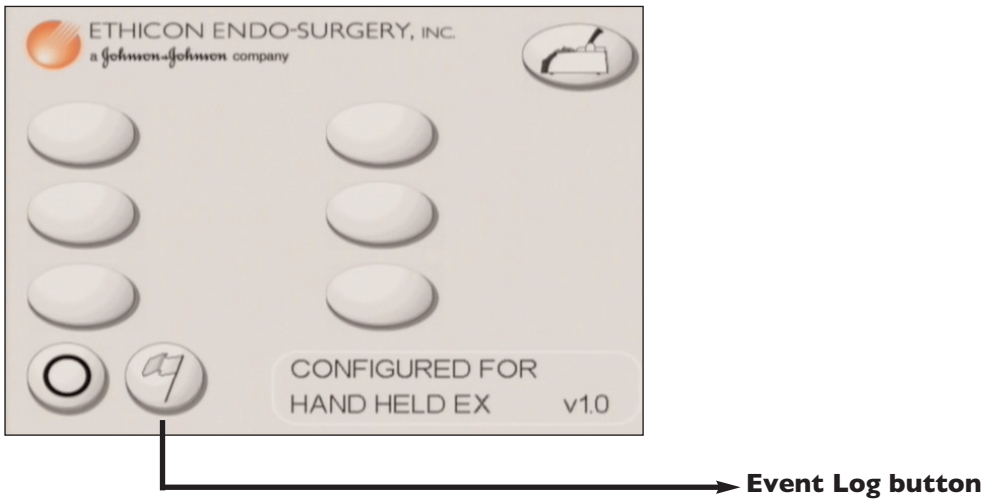

Figure 3-7. Physician Selection Screen

The Event Log Review screen lists system events in reverse chronological order. The system maintains and stores over 1000 system events for retrieval. The Event Log Review screen lists the following information for each recorded event (read from left to right): Event Number, Modality (e.g., 01- Boot), Software Version, Date, Time, and Event Type.

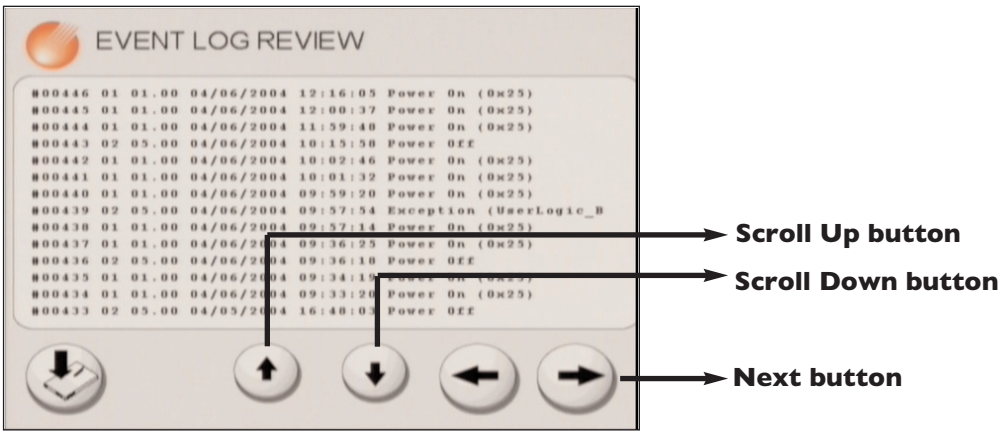

Figure 3-8. Event Log Review Screen

To scroll through the event log, press the **Scroll Up** and **Scroll Down** buttons.

The Usage Log Review screen presents a summary of usage data for the control module and the holster connected to the control module.

- To view the Usage Log, press the **Next** button on the Event Log Review screen.

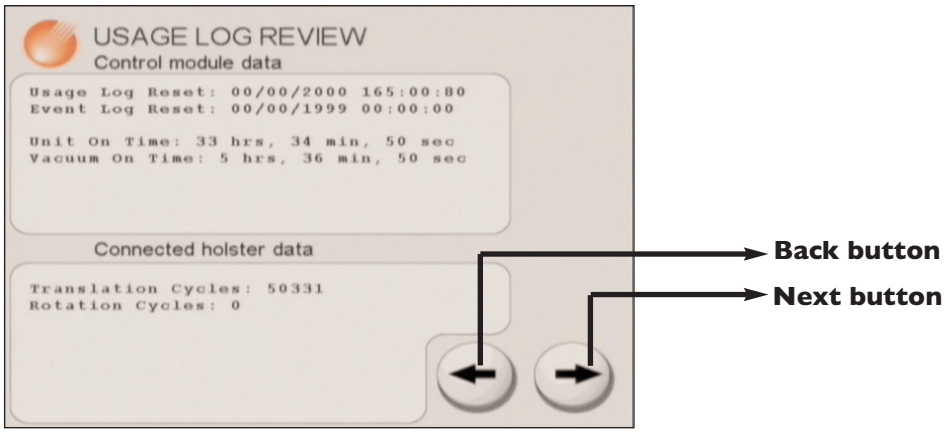
USAGE LOG REVIEW
Control module data
Usage Log Reset: 00/00/2000 165:00:80
Event Log Reset: 00/00/1999 00:00:00
Unit On Time: 33 hrs, 34 min, 50 sec
Vacuum On Time: 5 hrs, 36 min, 50 sec
Connected holster data
Translation Cycles: 50331
Rotation Cycles: 0
Back button
Next button

Figure 3-9. Usage Log Review Screen

- To return to the Event Log Review screen, press the **Back** button on the Usage Log Review screen.
- To return to the User Selection screen, press the **Next** button on the Usage Log Review screen.

Copying the Event and Usage Logs to a Memory Card

To copy the Event and Usage Logs to a standard PCMCIA card:

1. Select the **Copy Event and Usage Logs** button at the Event Log Review screen.
2. Insert a blank PCMCIA card into the back panel of the control module when you see the Copy Event and Usage Logs pop-up screen.

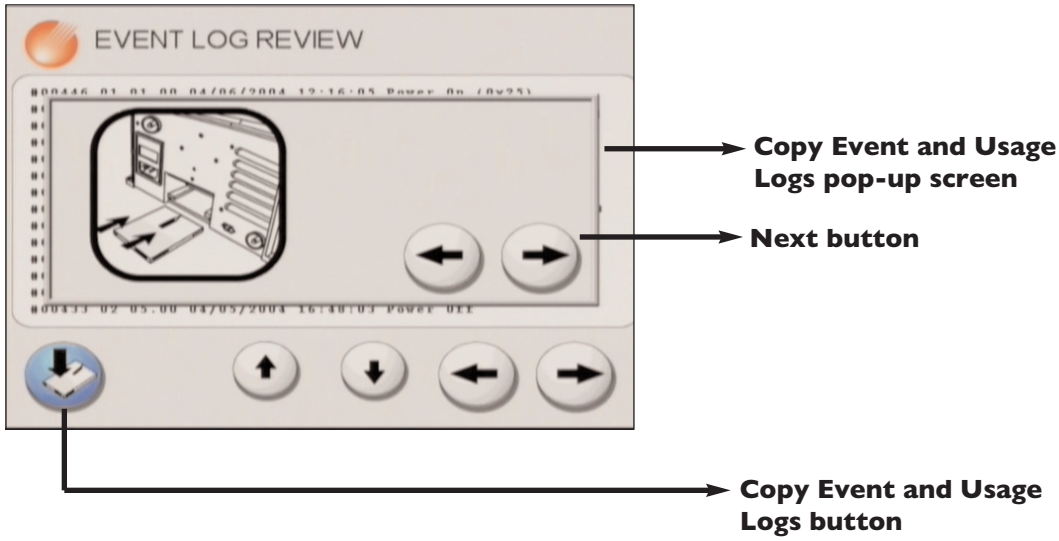

Figure 3-10. Copy Event and Usage Logs Pop-up Screen

3. Press the **Next** button on the Copy Event and Usage Logs pop-up screen to copy the Event and Usage Logs to the PCMCIA card.

4 When copying is complete, press the **Next** button on the following message pop-up screen to return to the Event Log Review screen.

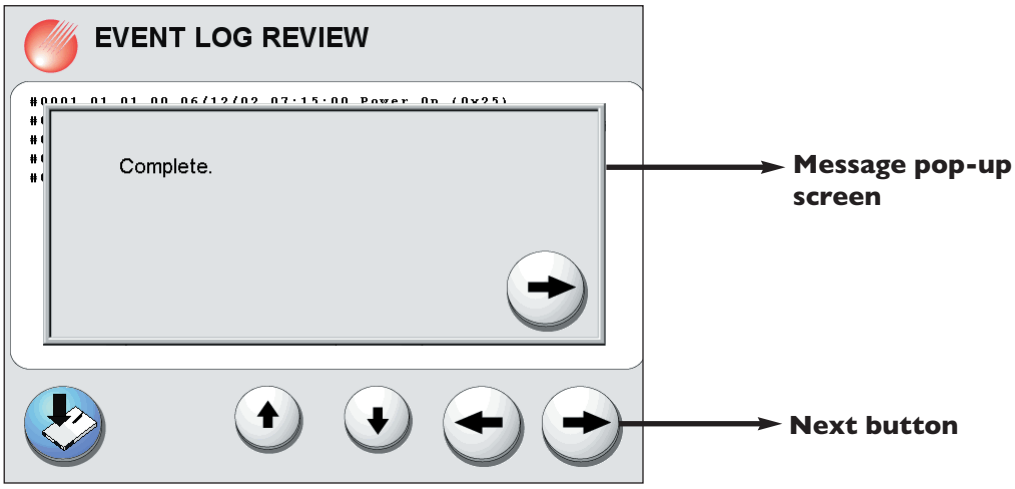

Figure 3-11. Copy Event and Usage Logs Pop-up Screen (Complete.)

5 Remove the PCMCIA card from the control module.

Note: If the PCMCIA card inserted into the control module contains application software, the following screen appears on the display.

Figure 3-12. Copy Event and Usage Logs Pop-up Screen (Card contains application software.)

6 Replace the PCMCIA card containing the application software with a blank PCMCIA card, and press the **Next** button on the message pop-up screen.

Note: If the PCMCIA card inserted in the control module is not blank, the following screen appears.

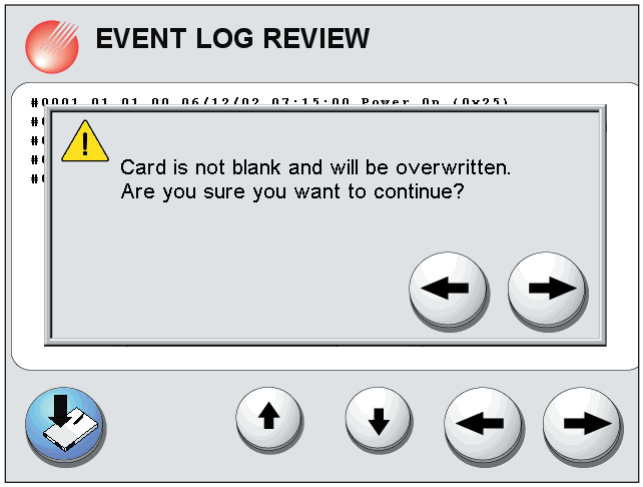

Figure 3-13. Copy Event and Usage Logs Pop-up Screen (Card is not blank. . .)

7 To replace the current PCMCIA card with a blank card before copying the Event and Usage Logs:

- Press the **Back** button on the pop-up screen.
- Insert the blank PCMCIA card in the control module when the Copy Event and Usage Logs pop-up screen appears.
- Press the **Next** button to copy the Event and Usage Logs to the PCMCIA card.

8 To erase the information on the PCMCIA card and copy the Event and Usage Logs to the PCMCIA card, press the **Next** button on the pop-up screen shown above.

9 If copying the Event and Usage Logs to a PCMCIA card could not be completed, the following pop-up screen appears on the display.

Figure 3-14. Copy Event and Usage Logs Pop-up Screen (Upload failed.)

- Press the **Forward** button on the message pop-up screen.
- Reinsert or replace the PCMCIA card when the Copy Event and Usage Logs pop-up screen appears on the display.

- Press the **Next** button on the Copy Event and Usage Logs pop-up screen to copy the Event and Usage Logs to the PCMCIA card.

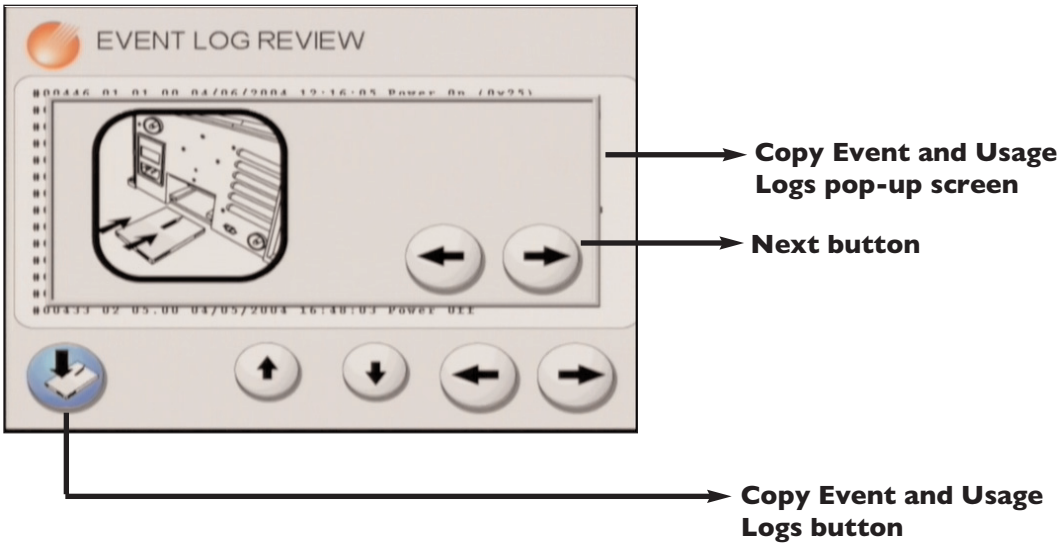

Figure 3-15. Copy Event and Usage Logs Pop-up Screen

Introduction

Chapter 4 Repair and Replacement Procedures describes how to repair and replace various components of the control module and cart, ST holster, and support arm.

Control Module Repair and Replacement Procedures

This section explains how to repair and replace the following components in the control module:

- Vacuum source tube
- LCD assembly
- Uniboard PCB
- Vacuum pump
- Translational and rotational motors
- Solenoid
- Interface board (if equipped)

Location and specification of control module fuses are also addressed.

Removing the Housing

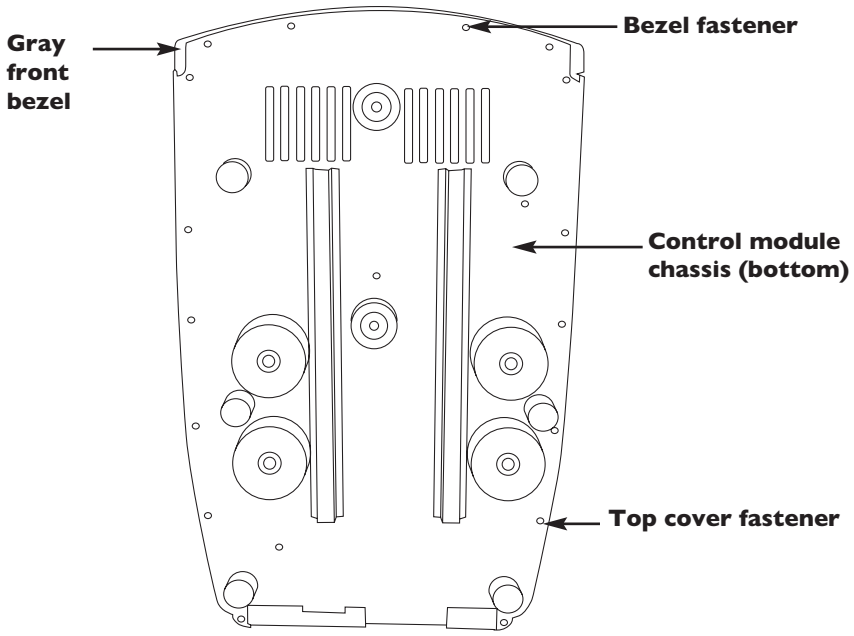

Figure 4-1. Removing the Control Module Housing

1. Remove the four (4) phillips head fasteners that mount the gray front bezel to the bottom of the control module. (Figure 4-1. Removing the Control Module Housing)
2. Remove the one (1) phillips head fastener recessed in the gray front bezel between the tubing set connection and the holster cable connections.
3. Remove the gray front bezel.
4. Remove the thirteen (13) phillips head fasteners that mount the top cover to the bottom of the control module chassis.

5 From the rear of the unit, loosen the thumbscrews and disconnect the two LCD cables fastened to the uniboard. (Figure 4-2. Disconnecting the LCD Assembly Cables and Ground Wire)

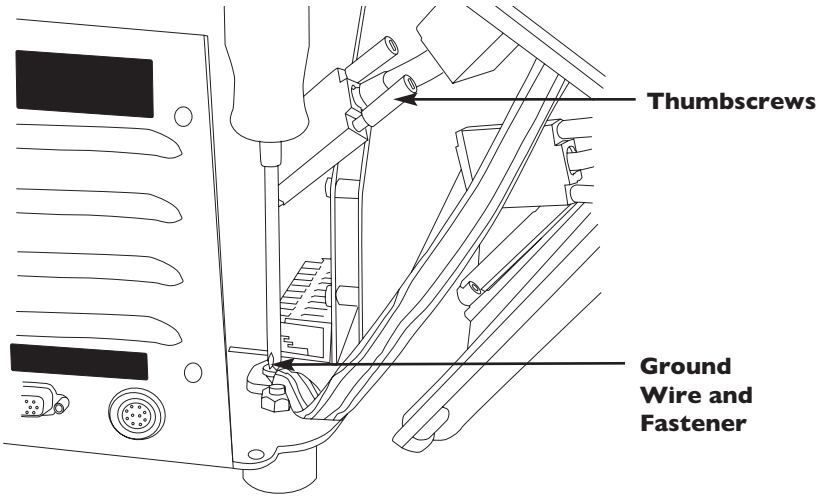

Figure 4-2. Disconnecting the LCD Assembly Cables and Ground Wire

6 Remove the fastener that connects the yellow and green ground wire from the LCD assembly to the chassis.

7 Disconnect the two-pin wire harness from J10 of the uniboard.

8 On the underside of the top cover where the vacuum tubing passes through to the top of the cover (directly below the plastic threads), slide the gray collar of the tubing connection upwards to free the top cover from the internal tubing and connector. (Figure 4-3. Freeing the Top Cover from the Internal Tubing and Connector)

9 Replace all faulty control module components, and reinstall the control module housing.

Note: Make certain to reconnect the ground wire to the chassis when reinstalling thecontrol module housing.

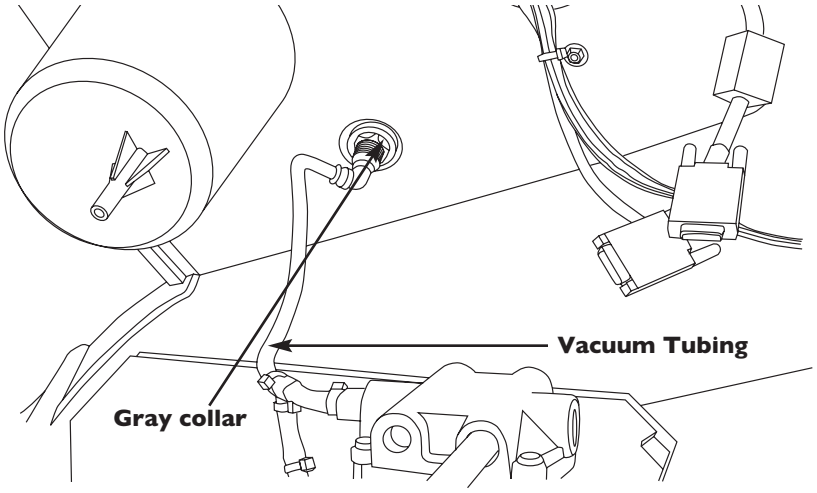

Figure 4-3. Freeing the Top Cover from the Internal Tubing and Connector

Replacing the Flexible Vacuum Source Tube

1 Disconnect the tube from the center port of the canister lid. (Figure 4-4. Replacing the Flexible Vacuum Source Tube)

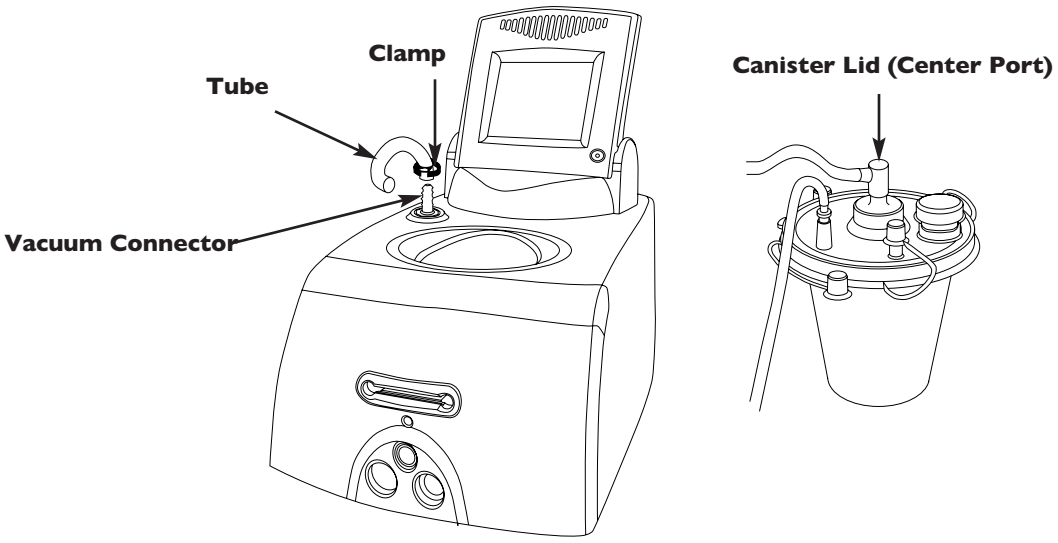

Figure 4-4. Replacing the Flexible Vacuum Source Tube

2 Remove the clamp with a sharp instrument if necessary.

3 Remove the tube from the vacuum connector.

4 Insert the new tube over the vacuum connector and secure it with the clamp.

5 Connect the new tube to the center port of the canister lid.

Location and Specification of Fuses

Location of Fuses	Control Module	Voltage Model	Amperage Rating	Size	Type Rating
Two fuses on inside of back panel	SCM12	125V	10A	3AG	Glass
	SCM23	250V	5A	5x20mm	Glass
Two fuses on board power supply	Both	250V	6.3A	5x20mm	Ceramic
Uniboard, F1	Both	250V	3.15A	5x20mm	Glass
Uniboard, F2	Both	250V	1A	5x20mm	Glass

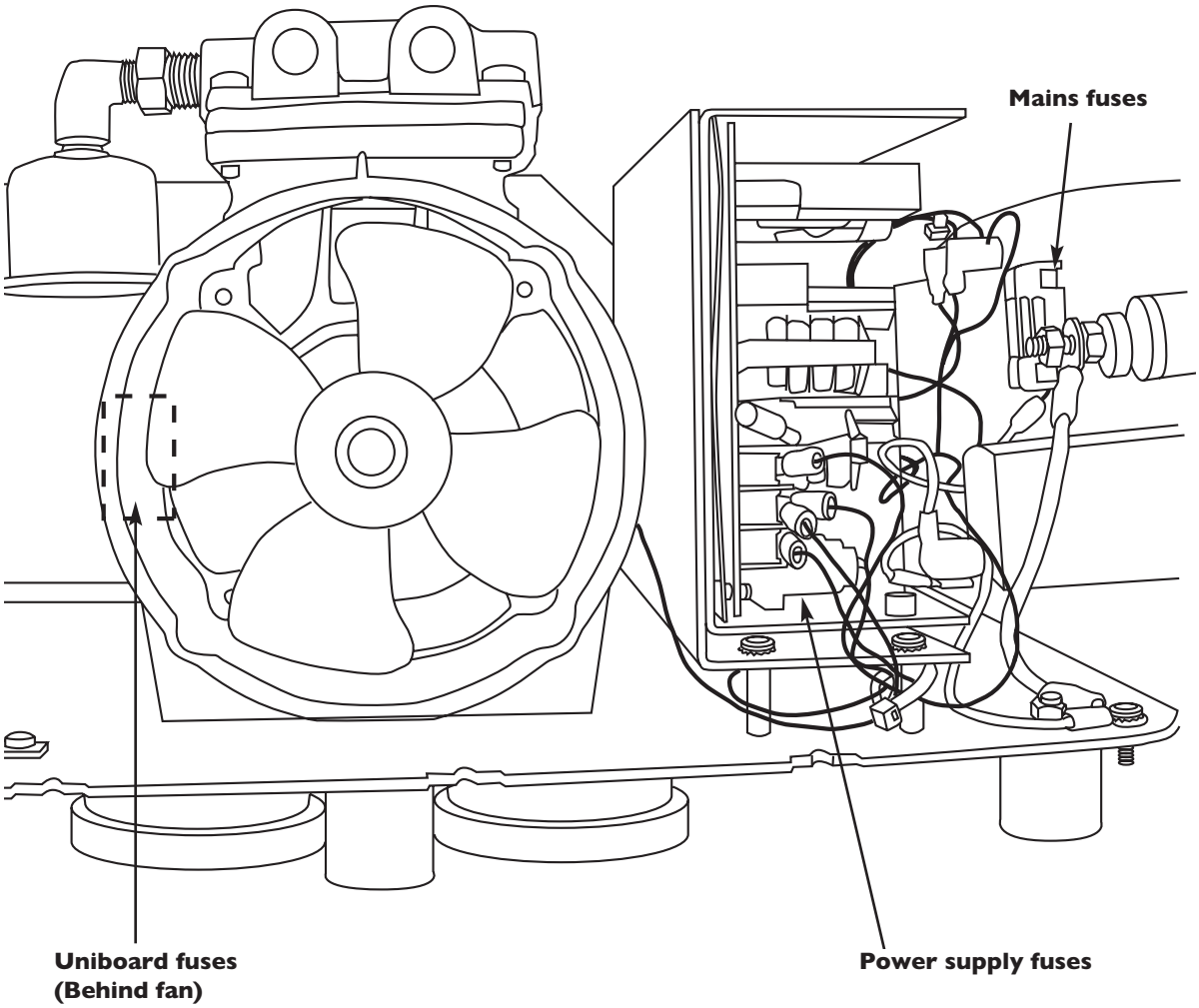

Figure 4-5. Fuse Location

Replacing the LCD Assembly Components

1 Remove the four (4) 11/32" fasteners from the underside of the top cover assembly. (Figure 4-6. Underside of the Top Cover Assembly)

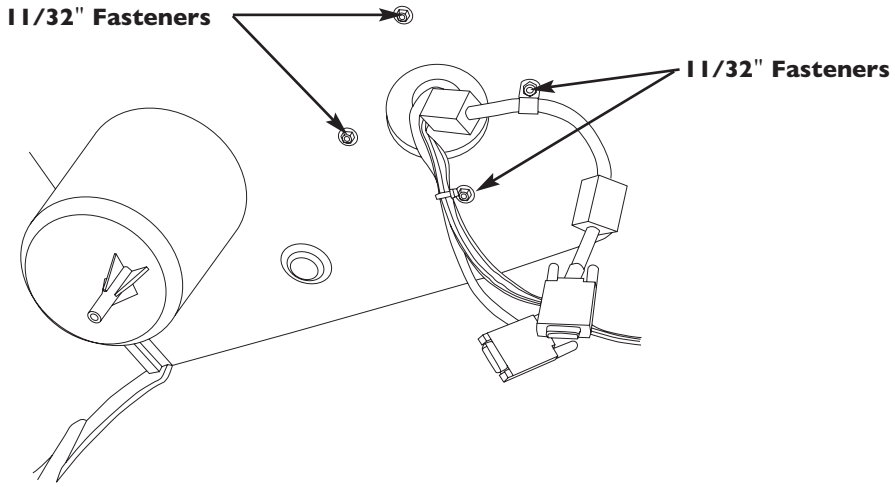

Figure 4-6. Underside of the Top Cover Assembly

2 Carefully pull the LCD assembly off of the cover, pulling the cables through the top hole.

3 From the bottom of the LCD assembly, spin the bracket to expose and remove each of the four (4) shoulder bolts with a 1/8" allen wrench. (Figure 4-7. Removing Shoulder Bolts from the Bottom of the LCD Assembly)

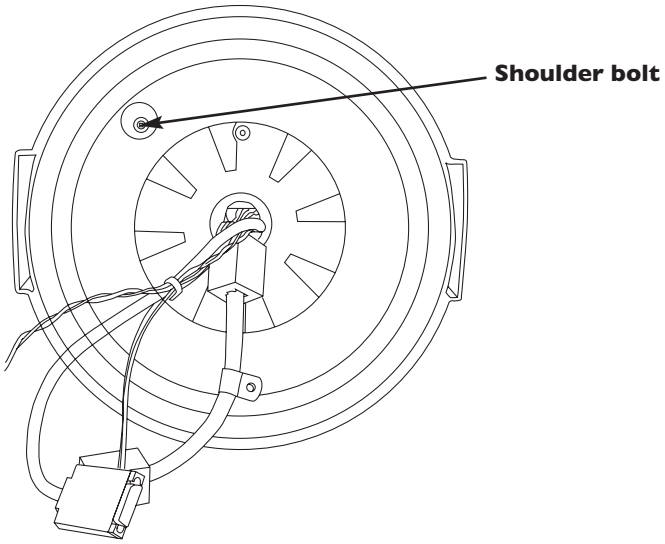

Figure 4-7. Removing Shoulder Bolts from the Bottom of the LCD Assembly

4 Slide the white tabletop cover off of the assembly.

5 Remove the two (2) 3/16" standoffs from the round base. (Figure 4-8. Removing Standoffs from the Round Base)

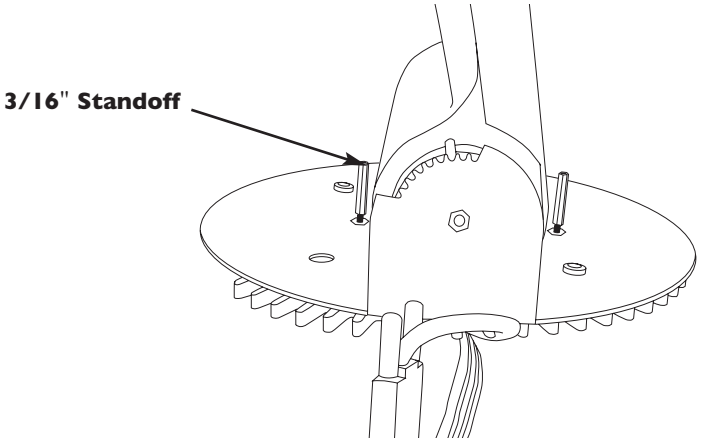

Figure 4-8. Removing Standoffs from the Round Base

6 Remove the seven (7) phillips head fasteners from the back of the gray housing.

Note: Two fasteners are hidden under gray adhesive dots. Remove and discard the dots before removing the fasteners.

7 Remove the white ferrite bead clamped on the larger LCD cable. This frees the LCD cables and allows the LCD front assembly to move more freely. (Figure 4-9. Freeing the LCD Cables)

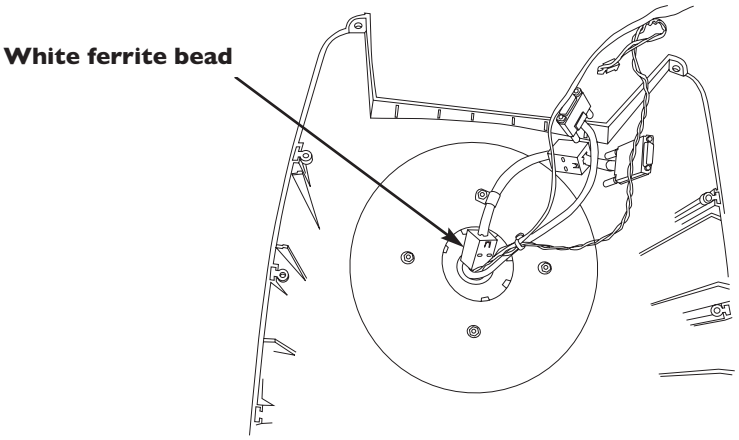

Figure 4-9. Freeing the LCD Cables

8 If it is necessary to replace the U-bracket, follow steps 8a through 8f.

a Remove the two (2) phillips head fasteners securing the U-bracket in place. (Figure 4-10. Replacing the U-Bracket)

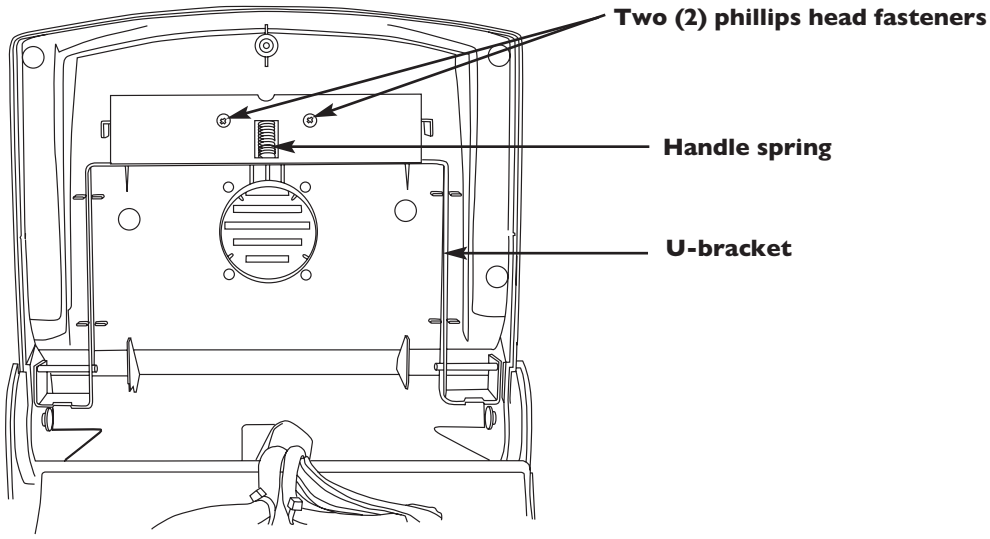

Figure 4-10. Replacing the U-Bracket

b Separate the U-bracket, rear LCD housing, and handle.

Note: The handle is held in place by a release spring.

c Place one pin of the new U-bracket into the pivot hole of the rear housing. Flex the other end of the U-bracket just enough to slide the other pin into place.

d Place the U-bracket between the guide ribs.

e Secure the U-bracket handle using the two fasteners previously removed.

f Compress the handle spring and insert into the handle.

9 If it is necessary to replace the LCD front assembly, follow steps 9a through 9f. (Figure 4-11. Replacing the LCD Front Assembly)

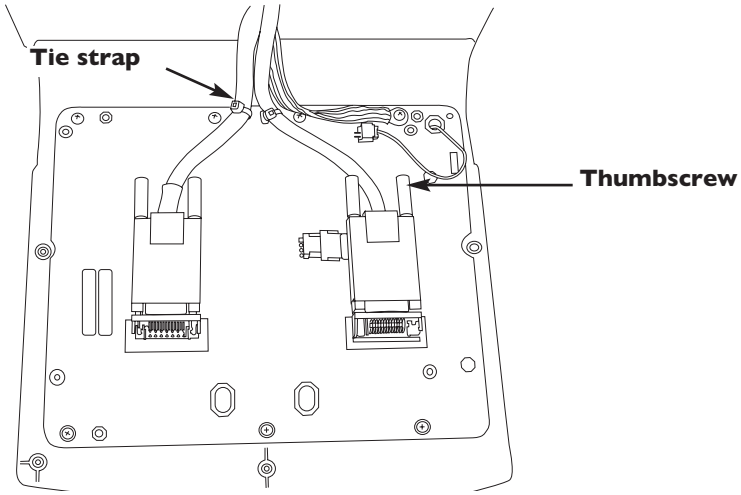

Figure 4-11. Replacing the LCD Front Assembly

a Loosen the thumbscrews and disconnect the two LCD cables from the PCB.

b Remove the fastener and star washer securing the ground cable.

c Cut the two tie straps securing the LCD cables.

Caution: **Do Not** cut the cable jacket.

d Remove the cables.

e Secure the LCD cables to the new LCD front assembly with two new tie straps.

f Remount the ground wire.

g Reinstall the LCD cables so that the thicker cable is at J1 of the PCB and the thin cable is at J6.

h Tighten the thumbscrews.

10 Make sure that the speaker is properly mounted, and the speaker wires pass through the wire holder or channel on the rear housing of the LCD.

11 Gently press the two halves together, pulling excess wires through as they come together. Make sure that the rubber tube does not pinch between the halves.

12 Secure with the seven (7) phillips head fasteners previously removed.

13 Clean the areas around the two fasteners flanking the speaker grille. Cover the fasteners with new adhesive dots.

14 Reconnect the ferrite bead to the thick LCD cable near the opening of the rubber resistance fingers.

15 Reinstall the two 3/16" standoffs.

16 Place the tabletop over the LCD assembly, with the beveled tabletop surface in front of the LCD.

17 Turn the assembly over and place the turntable on the rubber surface so that the four (4) fasteners extend from the turntable.

18 Spin the turntable to expose one of the four (4) mounting holes.

19 Thread one of the shoulder bolts into the exposed mounting hole until the bolt clears the top of the turntable, but **Do Not** tighten completely.

20 Install the remaining three shoulder bolts, and completely tighten all four.

21 Pass the LCD cables, speaker cable, and ground wire through the top cover housing.

22 Align the four (4) fasteners in the turntable with the top cover.

23 Firmly press the LCD assembly in place so that it rests flush with the top cover.

24 Replace the rubber washer on each of the four (4) studs. (Figure 4-12. Reassembling the LCD Assembly to the Top Cover Assembly)

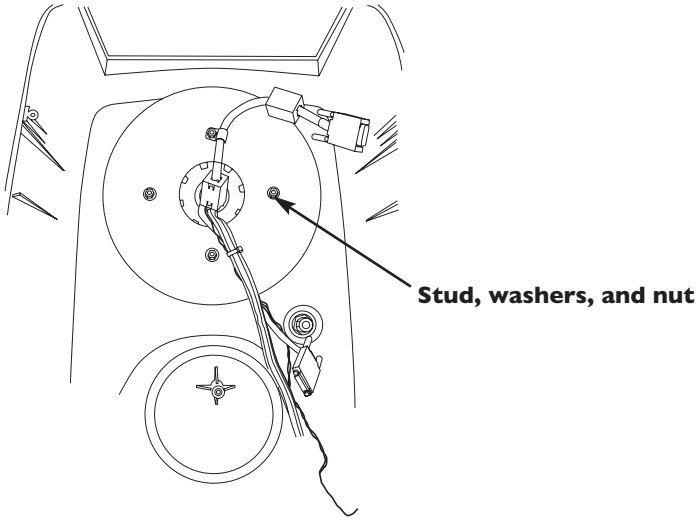

Figure 4-12. Reassembling the LCD Assembly to the Top Cover Assembly

25 Place a flat washer on each of the mounting studs, except the rear stud at the back of the housing.

26 With flat washers installed, secure three (3) 11/32" nuts onto the three studs.

27 Place a strain relief over the thick LCD cable and secure to the rear mounting stud so that the cable sets on the vacuum bulkhead side of center.

Replacing the Uniboard PCB Assembly

1 Remove the remaining four (4) phillips head fasteners that secure the uniboard bracket to the chassis.

2 Remove the remaining nine (9) wire harnesses and cable assemblies connected to the uniboard PCB assembly.

3 With even force, remove the tubing from the vacuum sensor of the uniboard PCB assembly.

4 Carefully slide the uniboard PCB assembly and bracket from the lower rear corner connector. (Figure 4-13. Replacing the Uniboard PCB Assembly)

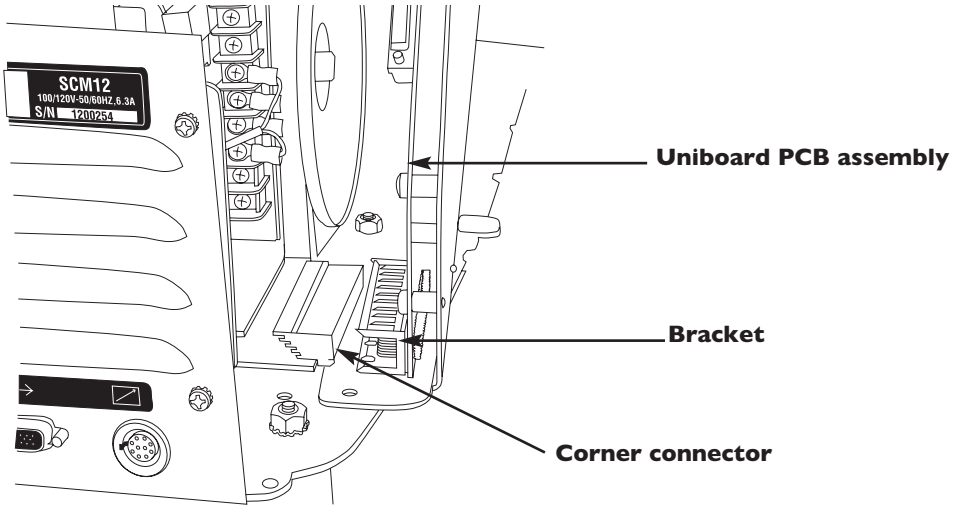

Figure 4-13. Replacing the Uniboard PCB Assembly

5 Remove the eight (8) phillips head fasteners that secure the uniboard to the bracket.

6 Replace the uniboard PCB assembly, and secure it to the bracket with the eight (8) fasteners.

7 At the lower rear corner of the uniboard PCB assembly, carefully connect the assembly to the connector PCB.

8 Reconnect all wire harnesses.

9 Reattach the vacuum tubing to the bottom fitting of the vacuum sensor.

Caution: Apply force in a straight, even motion; moving the tubing back and forth onto the sensor may cause the fitting to break.

10 Secure the bracket to the chassis with the four (4) fasteners.

Note: **Do Not** replace the rearmost fastener; this location will be required to fasten the ground wire from the LCD assembly when the top cover is replaced.

Replacing the Interface Board Assembly

1 Remove the two (2) wiring harnesses and one (1) power cable connector from the Interface board.

2 Remove the remaining two (2) phillips head fasteners that secure the interface board bracket to the capacitor and front interface bracket assemblies.

3 Remove the phillips head fasteners that secure the interface board to the bracket.

4 Replace the interface board and secure it to the bracket.

5 Reconnect all wiring harnesses.

6 Secure the bracket to the chassis with the two (2) fasteners.

Replacing the Vacuum Pump

1 Carefully remove the tie strap securing the tubing to the intake valve of the defective vacuum pump. (Figure 4-14. Replacing the Vacuum Pump)

Note: **Do Not** cut or damage the tubing.

2 Remove the tubing from the valve.

3 Remove the intake valve from the pump and retain for reassembling to the new vacuum pump.

4 Remove the muffler and brass fittings from the exhaust of the defective vacuum pump.

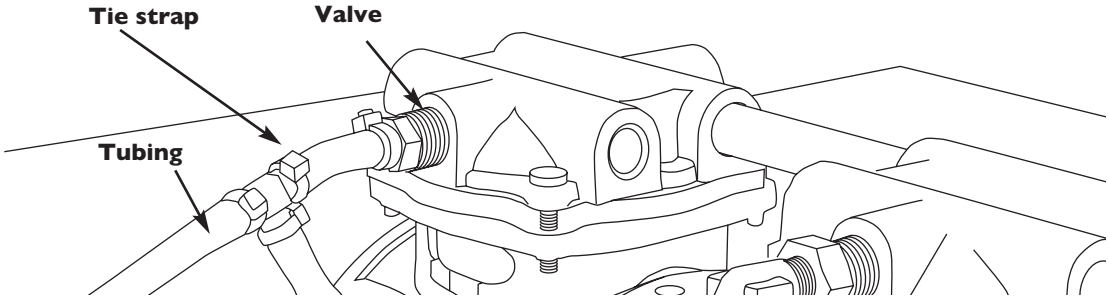

Figure 4-14. Replacing the Vacuum Pump

5 Disconnect the two spade connectors from the capacitor and remove the one (1) phillips head fastener that secures the green and yellow pump ground wire to the chassis. (Figure 4-15. Removing the Capacitor Spade Connectors and Vacuum Pump Ground Wire)

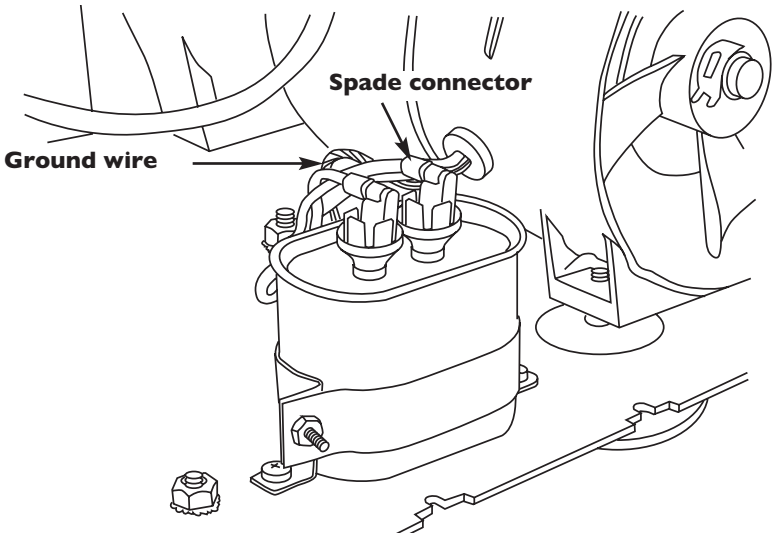

Figure 4-15. Removing the Capacitor Spade Connectors and Vacuum Pump Ground Wire

6 Disconnect the brown power wire from tab 2 of the solid state relay on the back panel of the control module.

7 Remove the center fastener at pin 2 of the terminal block P1 of the power supply to free the blue power wire of the defective pump.

8 Remove the four (4) 1/4"-20 x 1 1/2" fasteners on the underside of the chassis with a 5/32" allen wrench. (Figure 4-16. Removing the Four 1/4"-20 x 1-1/2" Fasteners on the Underside of the Chassis)

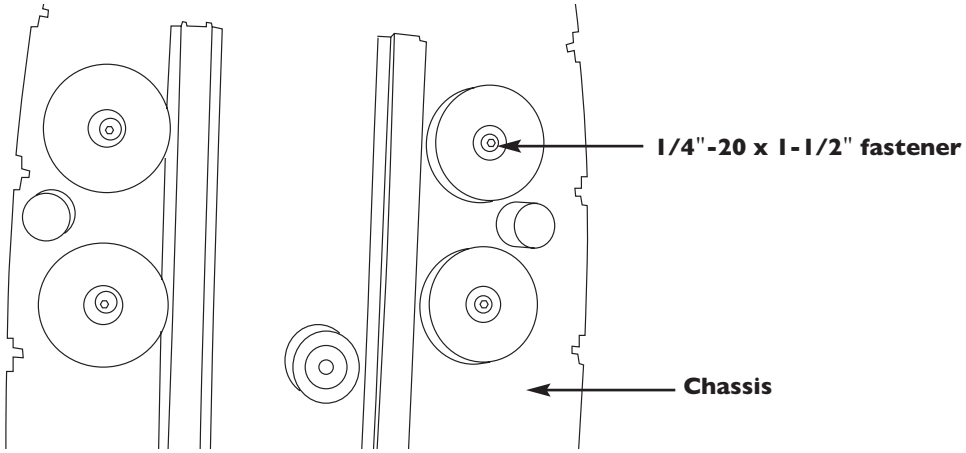

Figure 4-16. Removing the Four 1/4"-20 x 1-1/2" Fasteners on the Underside of the Chassis

9 Remove the defective vacuum pump.

10 Place the new pump over the mounting pads, ensuring that the intake port is the closest port to the uniboard.

11 Secure the pump with the four (4) 1/4"-20 x 1-1/2" fasteners treated with Loctite® 242® on the threads. Torque the fasteners to 120" lbs. ± 5" lbs.

12 Fasten the ground wire from the pump to the chassis using the 8-32 x 1/2" phillips head fastener removed in step 5.

13 Twist the two black wires from the pump four to seven times and connect them to the capacitor. There is no required polarity.

14 Plug the brown wire from the pump into tab 2 on the solid state relay on the back panel assembly.

15 At pin 2 of P1 of the power supply, fasten together the blue neutral wire from the pump and the blue neutral wire from the back panel.

16 Replace the brass fittings and the muffler, with the muffler facing down toward the base.

17 Replace the intake valve.

18 Place the vacuum tubing connection on the valve and tie the strap to secure.

Replacing the Translational and Rotational Motors

1 Remove the four (4) phillips head fasteners and two (2) standoffs in the channel of the interface bracket. (Figure 4-17. Replacing the Translational and Rotational Motors)

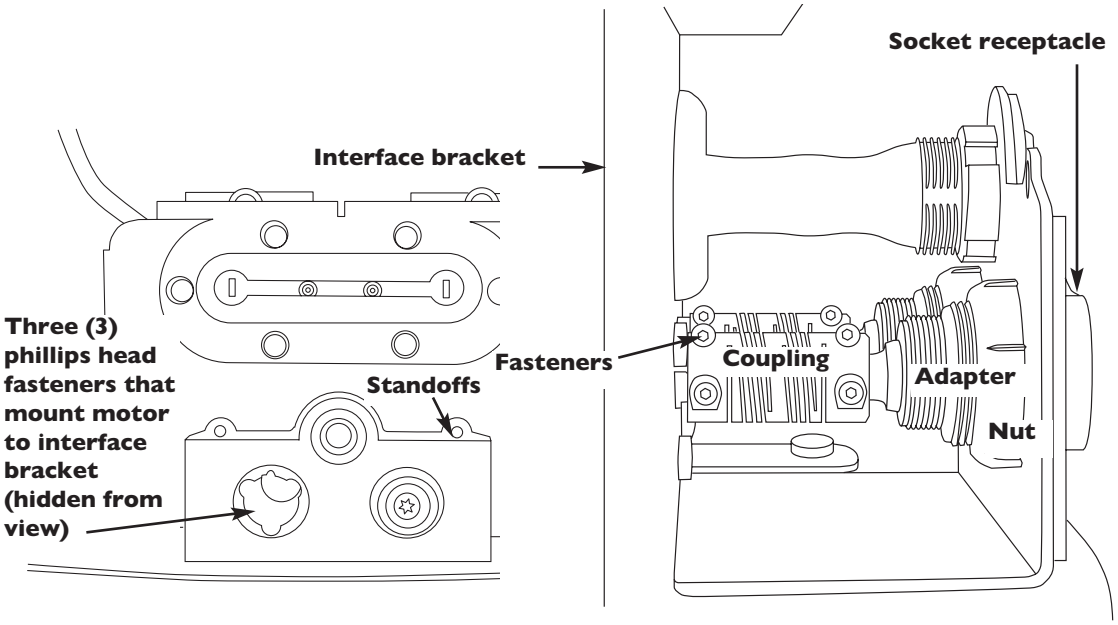

Figure 4-17. Replacing the Translational and Rotational Motors

2 With a 1.5 mm allen wrench, loosen the four (4) fasteners on each motor coupling.

3 Remove the adapter for the motor to be replaced.

4 Remove the nut and socket receptacle for the adapter.

5 Remove the coupling for the adapter.

6 Remove the three (3) phillips head fasteners mounting the motor to the interface bracket.

7 Remove the defective motor.

8 Install the replacement motor from the front of the control module as follows:

- **a** Mount the translation motor with the blue wires on the right side of the bracket; angle it so that the encoder wire harness is between 0º and 30º.
- **b** Mount the rotational motor on the left side of the bracket; angle it so that the encoder wire harness is between 150º and 180º.

9 Connect the encoder and motor power wire harnesses to the uniboard PCB assembly.

10 Slide the motor coupling over the motor shaft until the coupling bottoms out. Tighten the two (2) fasteners.

11 Slide the plastic jam nut onto the coupling so that the chamber is on the motor side.

12 Slide the motor adapter onto the motor coupling until the adapter bottoms out.

13 Secure the adapter to the motor coupling with the screws to a torque of 3" lbs. ± 0.2" lbs.

14 Remove and discard the used thread sealant tape from the green or blue receptacle.

15 From the rear of the receptacle, wrap new thread sealant tape clockwise around the threads no less than two complete revolutions.

Note: Make sure that the receptacle is properly seated (aligned) with the alignment notch.

16 Torque the jam nut to 30.5 in.-lbs. ± 1 in.-lb.

17 Reinstall and secure the two (2) standoffs with the four (4) phillips head fasteners.

Replacing the Solenoid

1 Identify the solenoid in need of replacement. (Figure 4-18. Replacing the Solenoid)

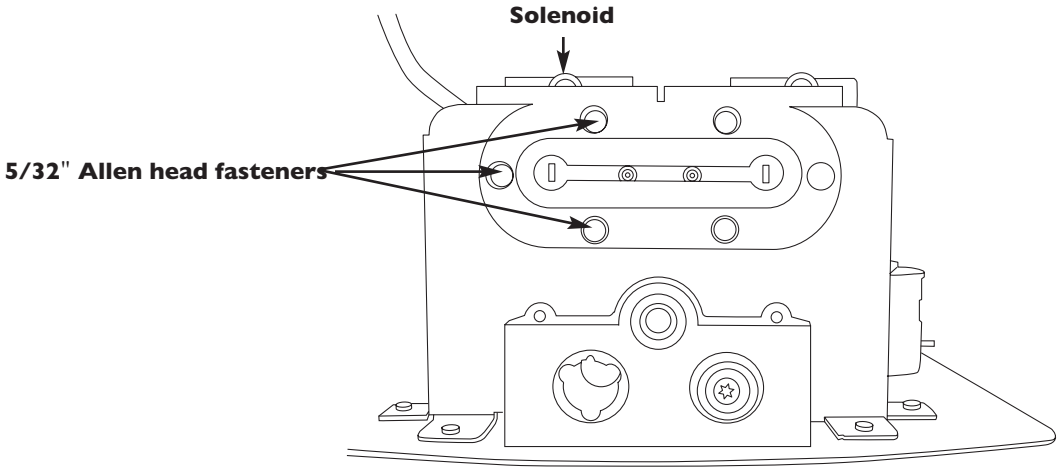

Figure 4-18. Replacing the Solenoid

2 Disconnect the solenoid wire harness from the uniboard PCB assembly.

3 Using a 5/32" allen wrench, remove the three (3) allen head fasteners for the defective solenoid.

Note: These fasteners are found on the white tubing set connection block.

4 Remove the solenoid, taking note of its mounting orientation.

5 Install the replacement solenoid.

Note: The solenoid on the left is mounted so that the wire harness comes out of the top while the solenoid on the right is oriented so that the label is on the top.

6 Tighten the three (3) 5/32" allen head fasteners.

7 Restore the wire harness connection to the uniboard PCB assembly.

ST Holster Repair and Replacement Procedures

The instructions that follow describe how to replace the following components in the ST holster:

- Cable assembly
- Encoder assembly
- Transmission mounting bracket assembly
- PCB
- Firing mechanism
- Safety mechanism components

To replace one or more of these components, first follow the instructions in **Disassembling the Holster**.

Disassembling the Holster

1. Remove the rotation knob from the rear of the holster by gently pulling the knob straight back. (Figure 4-19. Removing the Rotation Knob)

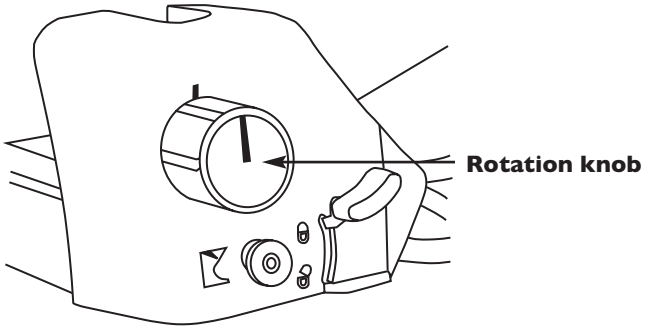

Figure 4-19. Removing the Rotation Knob

2. Using a 5/64" allen wrench, remove the fastener in the firing button.
3. Remove the firing button. (Figure 4-20. Removing the Firing Button)

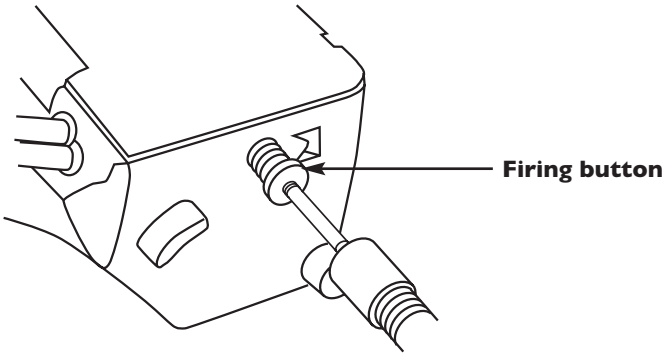

Figure 4-20. Removing the Firing Button

4 Remove the retaining ring that captures the port shaft. This ring is copper in color and can be found at the back of the rotation knob. (Figure 4-21. Removing the Retaining Ring)

Note: This step requires the use of external retaining ring pliers (McMaster-Carr® p/n 58225A23).

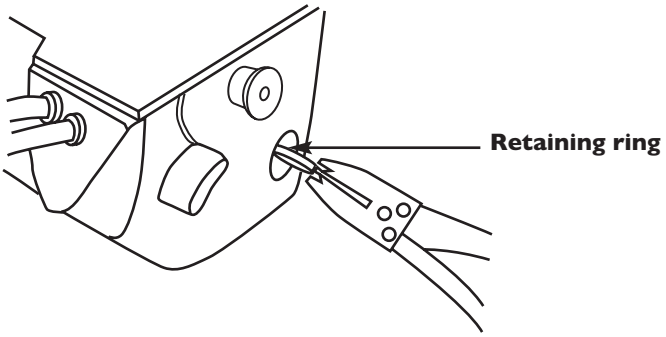

Figure 4-21. Removing the Retaining Ring

5 Carefully push the port shaft forward and remove it, taking care not to remove or misalign the gear. (Figure 4-22. Removing the Port Shaft)

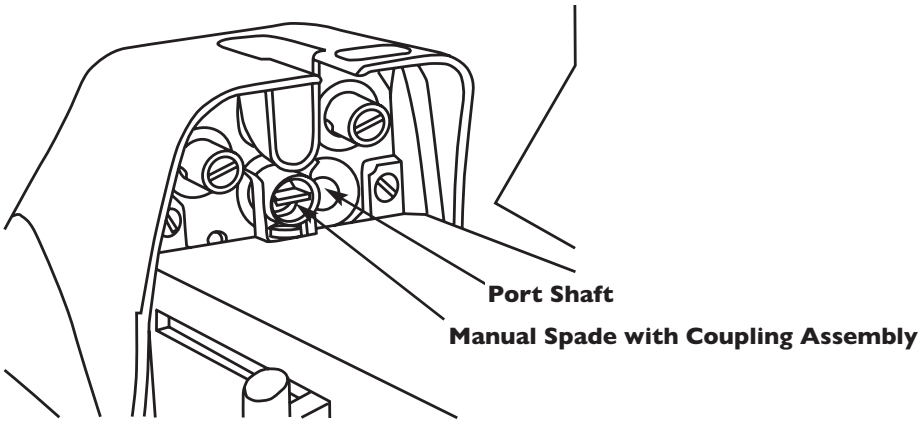

Figure 4-22. Removing the Port Shaft

6 Using a 0.050" allen head wrench, remove the four (4) fasteners that mount the gray shroud to the bottom of the holster. (Figure 4-23. Removing the Gray Shroud)

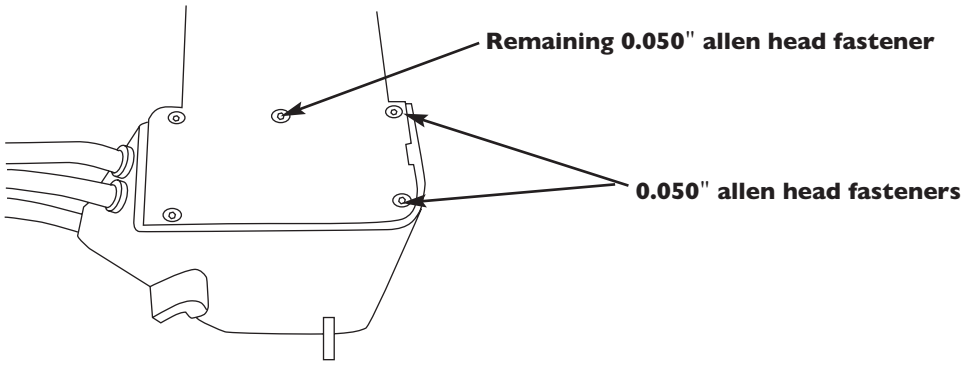

Figure 4-23. Removing the Gray Shroud

7 Slide the shroud upward and remove.

Note: To replace safety mechanism components, see **Replacing the Safety Mechanism Components**.

8 Remove the one (1) remaining 0.050" allen head fastener to enable the separation of the upper and lower frames.

9 To remove the lower frame, pull slightly back on the arming levers. This will free the tabs at the front of the frame.

10 Slide the rubber boot 1" to 2" down the cables, and away from the holster.

11 There is a tie strap around the PCB assembly. This tie strap secures the encoder wire harness and the electrical cable wire harness to the PCB. Remove the tie strap and unplug the two connectors. (Figure 4-24. Removing the Tie Strap Around the PCB Assembly)

Warning: Do not pull on the wires in order to remove the connectors. Move the connector back and forth to loosen and remove.

Note: To replace the firing mechanism, see **Replacing the Firing Mechanism**. To replace the PCB assembly, see **Replacing the PCB Assembly**.

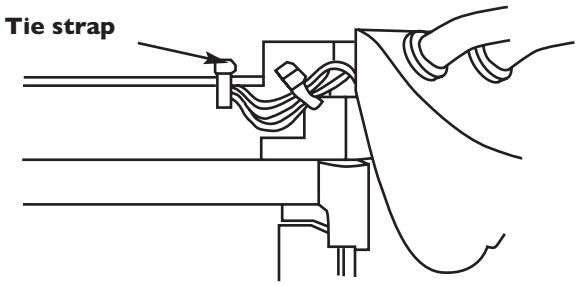

Figure 4-24. Removing the Tie Strap Around the PCB Assembly

12 Remove the two 3/32" allen head fasteners that mount the transmission assembly to the upper frame. (Figure 4-25. Removing the Tie Strap Around the PCB Assembly)

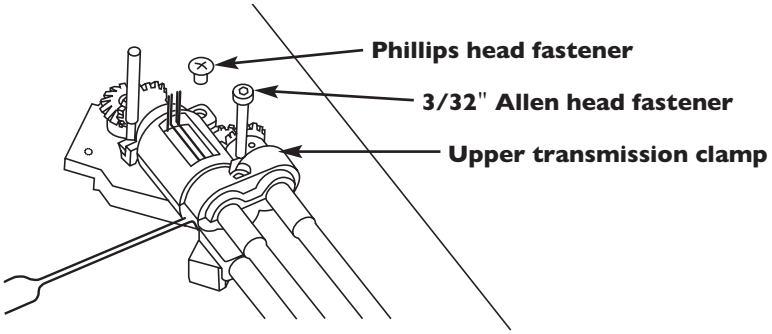

Figure 4-25. Removing the Upper Transmission Clamp

13 Hold the loose rotation gear in place during removal and secure with a piece of tape.

14 To remove the upper transmission clamp, remove the phillips head fastener and the 3/32" allen head fastener.

Note: To replace the cable assembly, see **Replacing the Cable Assembly**. To replace the encoder, see **Replacing the Encoder Assembly**. To replace the transmission bracket assembly, see **Replacing the Mounting Bracket Assembly**.

Replacing the Cable Assembly

1 Remove the two drive cables from the lower clamp.

2 Remove the 3/32" allen head fastener securing the bottom clamp in place. (Figure 4-26. Replacing the Cable Assembly)

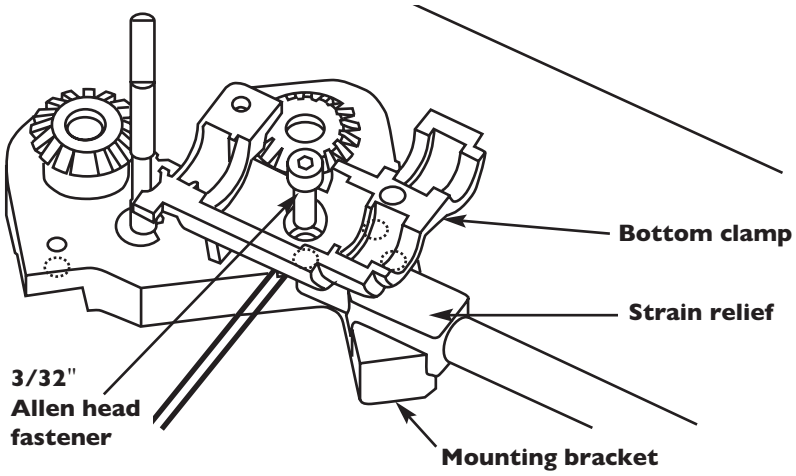

Figure 4-26. Replacing the Cable Assembly

3 Press the strain relief of the defective electrical cable out of the bracket.

4 Press the strain relief of the new cable into the mounting bracket.

5 Install the lower transmission bracket using a new 3/32" allen head fastener.

6 Place the two drive cables back into their respective places in the bottom clamp. Ensure that the encoder mates with the translational cable.

7 Place the encoder in the bottom clamp with the label and wires facing up.

8 Slip the wire harness of the encoder through the opening in the top clamp and attach the top clamp to the bottom clamp with the phillips head fastener and a new 3/32" allen head fastener.

Warning: Do not over tighten the phillips head fastener since this may damage the threads in the clamp.

9 Remount the transmission bracket to the upper frame, making certain the electrical cable and encoder wire harness are routed to avoid damage when the shroud is closed.

Replacing the Encoder Assembly

1 Uncouple the encoder assembly from the drive cable and lift it out of the bottom transmission clamp. (Figure 4-27. Replacing the Encoder Assembly)

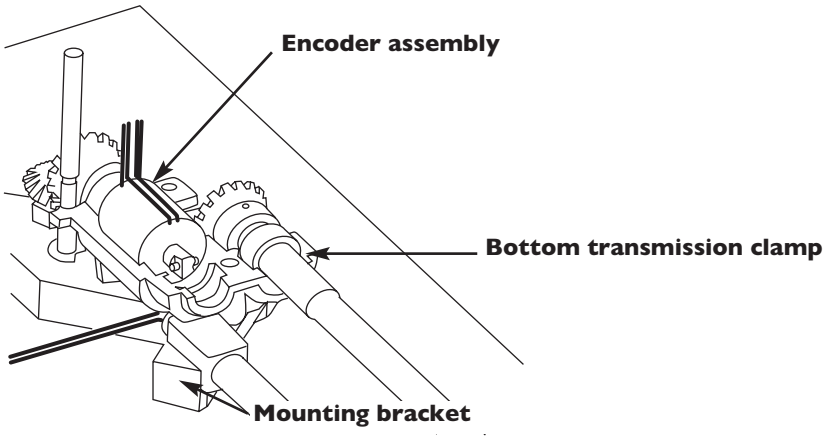

Figure 4-27. Replacing the Encoder Assembly

2 Place the new encoder assembly in the bottom clamp with the label and wires facing up. Make sure that the encoder mates with the translational cable. (Figure 4-28. Mating the Encoder Assembly with the Translational Cable)

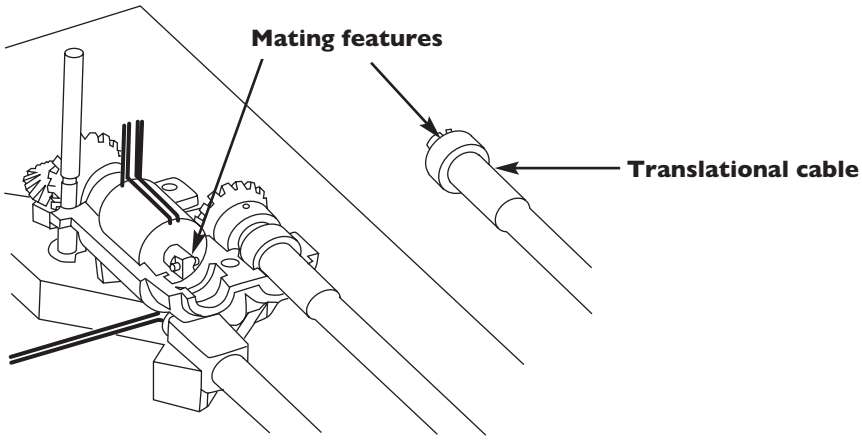

Figure 4-28. Mating the Encoder Assembly with the Translational Cable

3 Recalibrate the PCB.

Replacing the Mounting Bracket Assembly

1 Lift the two drive cables out of the bottom transmission clamp. (Figure 4-27. Replacing the Encoder Assembly)

2 Remove the 3/32" allen head fastener that secures the bottom clamp in place.

3 Press the strain relief of the electrical cable out of the bracket.

4 Press the strain relief of the electrical cable into the new mounting bracket assembly.

5 Install the lower transmission bracket using a new 3/32" allen head fastener.

6 Place the two drive cables back into their respective places in the bottom clamp. Make sure that the encoder mates with the translational cable.

7 Place the encoder in the bottom clamp with the label and wires facing up.

8 Slip the wire harness of the encoder through the opening in the top clamp and attach the top clamp to the lower clamp with the phillips head fastener and a new 3/32" allen head fastener.

Warning: Do not over tighten the phillips head fastener since this may damage the threads in the clamp.

9 Remount the transmission bracket to the upper frame, making certain the electrical cable and encoder wire harness are routed to avoid damage when the shroud is closed.

Replacing the PCB Assembly

1 Remove the three (3) phillips head fasteners with the captured star washers. (Figure 4-29. Replacing the PCB Assembly)

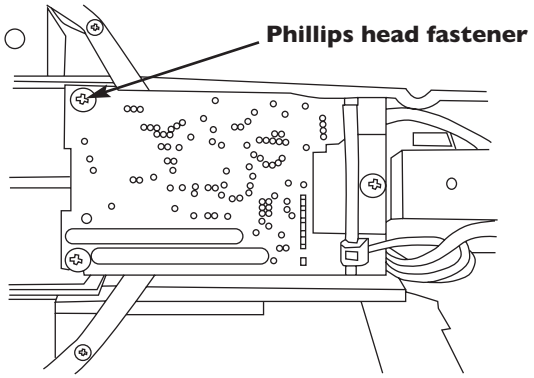

Figure 4-29. Replacing the PCB Assembly

2 Install the new PCB and fasten with the three (3) phillips head fasteners.

3 Calibrate the PCB.

Replacing the Firing Mechanism

1 Remove the three (3) phillips head fasteners with the captured star washers to free the PCB.

2 Loosen the thumbscrew and remove the firing fork. (Figure 4-30. Removing the Firing Fork)

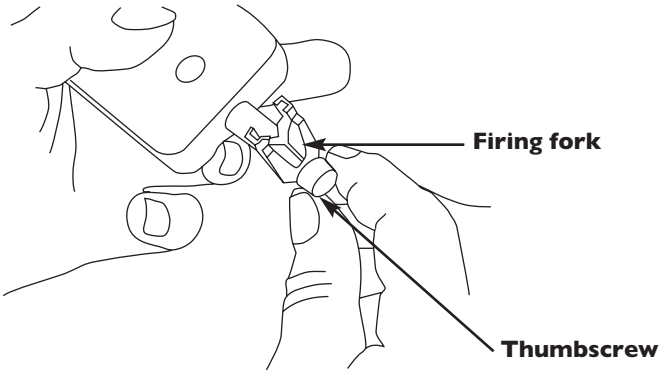

Figure 4-30. Removing the Firing Fork

3 Remove the four (4) phillips head fasteners and the two clamp plates. (Figure 4-31. Removing the Clamp Plates)

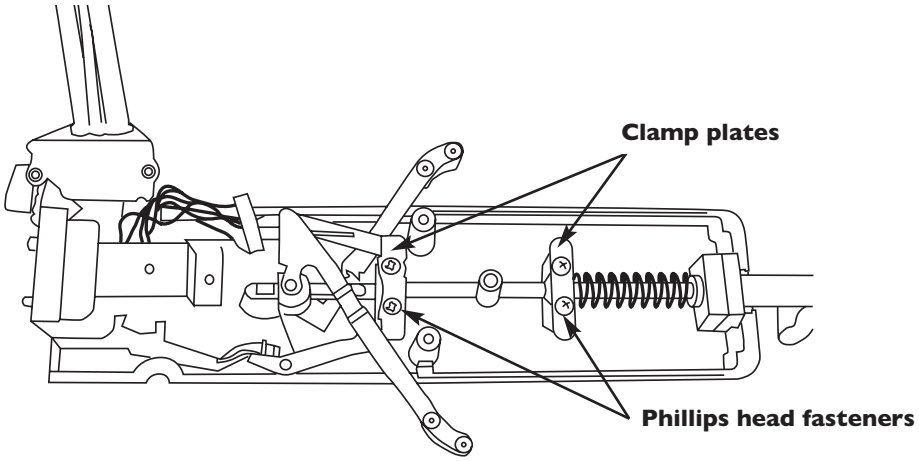

Figure 4-31. Removing the Clamp Plates

4 Remove the firing mechanism from the frame.

5 Slightly compress the firing spring and drop the new firing mechanism into place.

Note: Ensure that the two nylon bushings are in the U-channels. (Figure 4-32. Nylon Bushings in the U-Channel)

Warning: While under compression, the firing spring may be unstable.

Note: For optimal performance, apply Krytox® lubricant to all moving metal to metal interfaces.

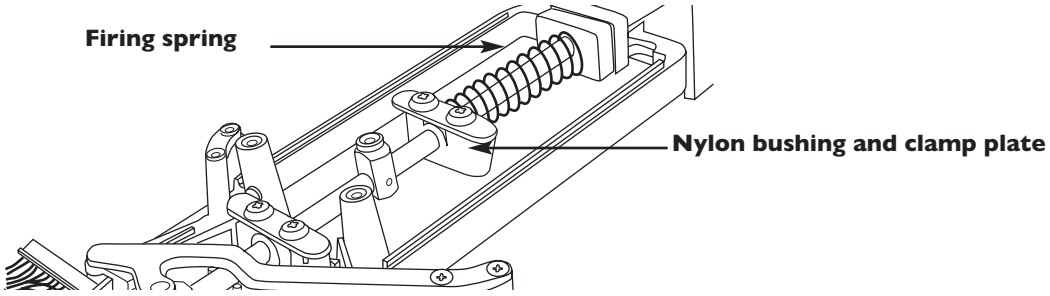

Figure 4-32. Nylon Bushings in the U-Channels

6 Capture the firing mechanism with the two clamp plates and four (4) new phillips head fasteners.

7 Mount the PCB again with the three (3) phillips head fasteners.

8 Install the firing fork and the thumbscrew.

Replacing the Safety Mechanism Components

1 Remove the three 5/64" allen head fasteners near the safety lever. (Figure 4-33. Replacing the Safety Mechanism Components)

Caution: Safety mechanism components are under spring pressure.

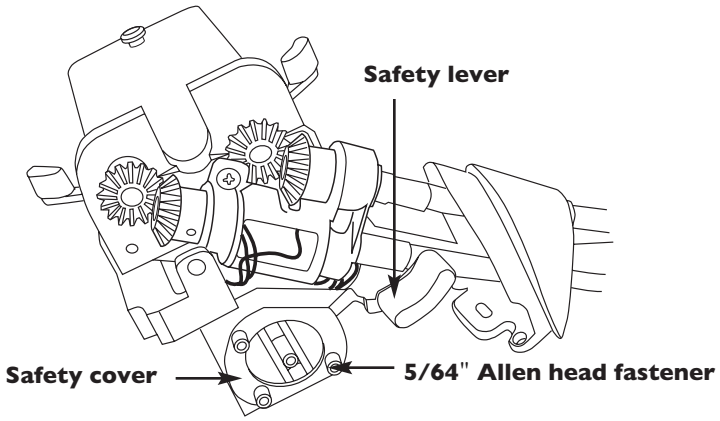

Figure 4-33. Replacing the Safety Mechanism Components

2 Replace the defective safety mechanism components.

3 Reassemble the safety mechanism in the following order:

- **a** Place the firing button shaft in the channel with the tab oriented toward the transmission assembly.
- **b** Use the white plastic block to hold the firing button shaft in place.
- **c** Place the torsion spring in the block so that the end with the right angle bend is on top.
- **d** Place the safety latch over the torsion spring, ensuring that the spring end passes through the small hole in the latch.

4 Place the safety cover over the entire assembly and secure with the three (3) 5/64" allen head fasteners.

Reassembling the Holster

1 Connect the two wire harnesses to the PCB; secure with a tie strap wrapped around the PCB and placed in the grooves on the sides. Note the proper routing of the wires in Figure 4-34. Reconnecting the Wire Harnesses to the PCB.

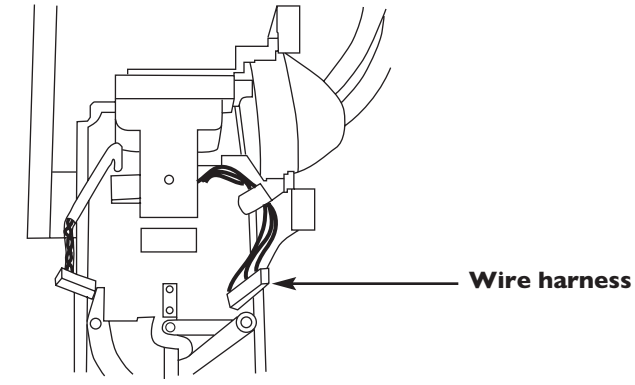

Figure 4-34. Reconnecting the Wire Harnesses to the PCB

2 Slide the rubber boot back towards the transmission assembly.

3 Reattach the lower frame by inserting the tabs into the upper frame and pivoting the back of the frame into place. Pull slightly back on the cocking levers as you insert the tabs.

4 Replace the 0.050" allen head fastener attaching the upper and lower frame.

5 Slide the shroud over the holster and fasten with the four 0.050" allen head fasteners.

6 Push the port shaft into the spur gear.

Note: Make sure that when the flat of the port shaft is facing up, the rotation spade on the other side of the assembly is horizontal.

7 Replace the retaining ring on the port shaft.

8 Install the firing button and the allen head fastener.

9 Using the flat surface of the port shaft as a guide, push the rotation knob into place.

EX Holster Repair and Replacement Procedures

The instructions that follow describe how to replace the following components in the EX Holster:

- Power cord assembly
- Bottom housing
- Top housing
- Keypad cover
- Flex circuit assembly
- Front DC motor (rotation)
- Rotation motor extension shaft
- Rotation motor drive shaft
- Rear DC motor (translation) and gear
- Drive shafts, bushings, chains, and gears

Note: All fasteners must have a pre-applied bead of Loctite and be tightened with a torque driver to 2.0 +/- .5 in-lbs.

Replacing the Power Cord Assembly

1 Remove the two (2) phillips head fasteners from the power cable mount and slide the assembly straight back to remove.

2 Inspect seal on bottom housing. If seal is broken or damaged, replace the housing.

3 To replace, slide the assembly back into the jack and push forward, insert the two (2) phillips head fasteners, and tighten.

Replacing the Bottom Housing

1 Remove the power cable assembly.

2 Remove the phillips head fastener from the rear of the housing.

3 Holding the bottom housing at the rear, pull the housing up and rotate toward the front of the holster, taking care not to break the locking tabs on the front of the housing. (Figure 4-35. Replacing the Bottom Housing)

4 Inspect seals on bottom housing. If seal is broken or damaged replace the housing.

5 To replace the bottom housing, reverse the above procedure.

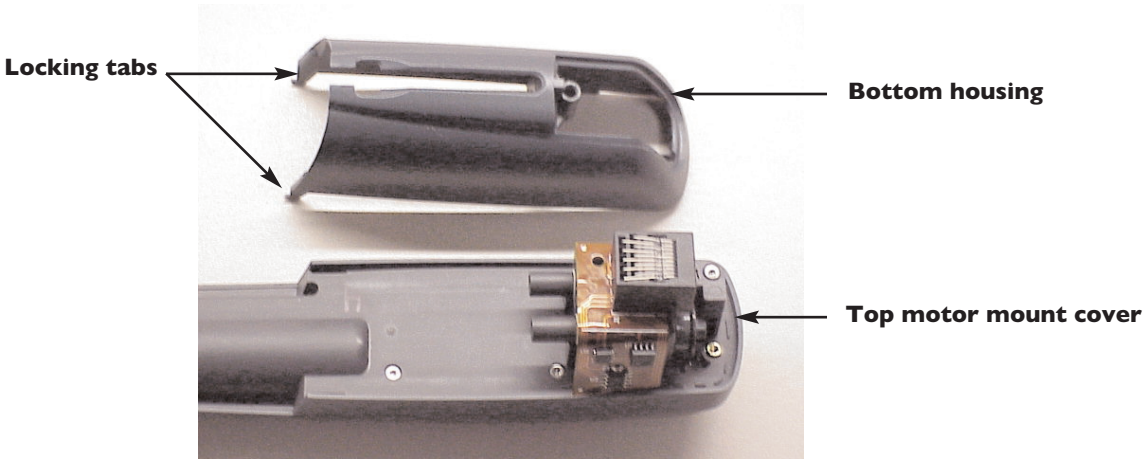

Figure 4-35. Replacing the Bottom Housing

Replacing the Top Housing

1. Remove the power cable assembly.
2. Remove the bottom housing.
3. Remove the six (6) phillips head fasteners holding the top motor mount and top housing together.
4. Pull the top housing away from the top motor mount. (Figure 4-36. Replacing the Top Housing)
5. Inspect the seals on the top housing and around the keypad cover for damage. If damaged, the top housing must be replaced.
6. To replace the top housing, reverse the above procedure.

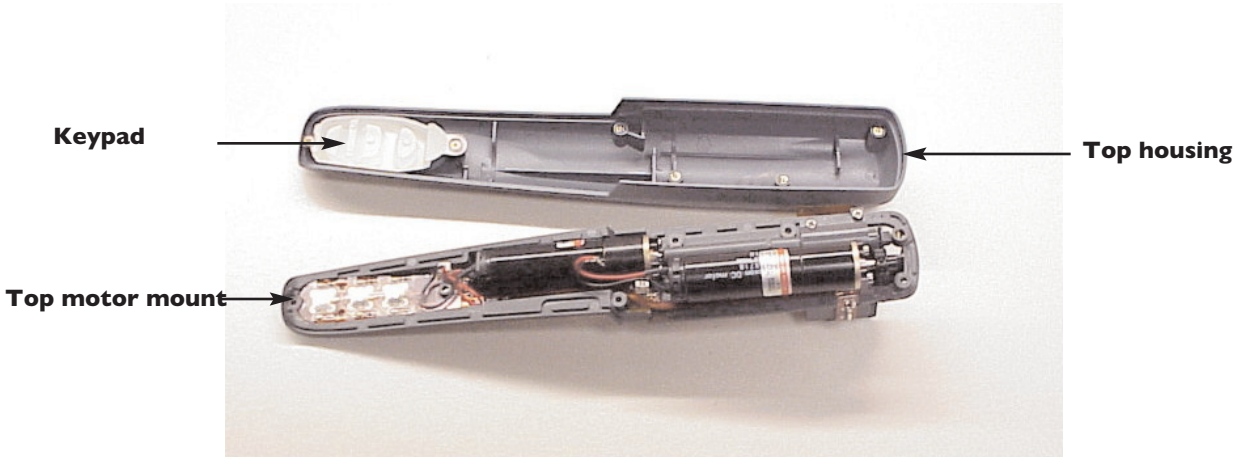

Figure 4-36. Replacing the Top Housing

Replacing the Keypad Cover

Note: The keypad cover is glued to the top housing to create a seal.

1. Remove the power cable assembly.
2. Remove the bottom housing.
3. Remove the six (6) phillips head fasteners holding the top motor mount and top housing together.
4. Pull the top housing away from the top motor mount.
5. Replace the top housing (the new top housing includes the keypad).

Replacing the Flex Circuit Assembly

1 Remove the power cable assembly.

2 Remove the bottom housing.

3 Remove the six (6) phillips head fasteners holding the top motor mount and top housing together.

4 Pull the top housing away from the top motor mount.

5 Turn the top motor mount upside down and unplug the motors from the flex circuit assembly. Use a small flat screwdriver to separate the plug from the receptacle being careful not to pull the wires out of the plug.

6 Slide the Flex Circuit Assembly from underneath the motors and pull it up off of the alignment post, then remove the Assembly.

7 To replace the Flex Circuit Assembly reverse the above procedure, making certain that the board slides far enough under the motors to keep it from being pinched by the top housing.

8 Apply Kapton Tape over the bare connectors on top of the Flex Circuit Assembly. (See Figure 4-37. Kapton Tape Placement).

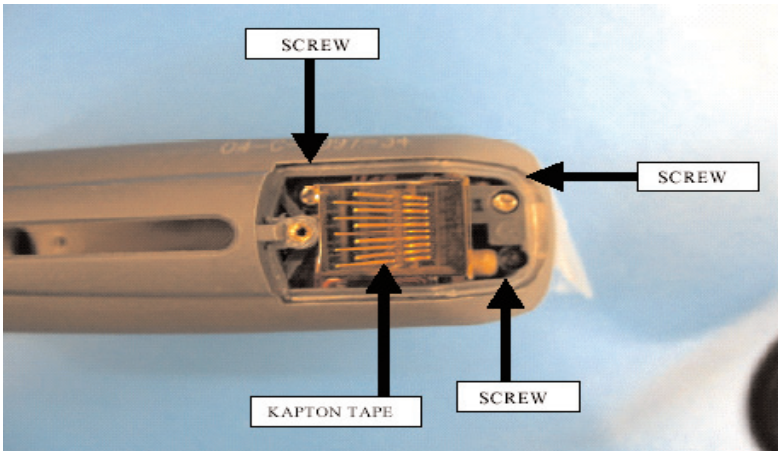

Figure 4-37. Kapton Tape Placement

Replacing the Front DC Motor (Rotation)

Note: The rotation motor (p/n D13392P01/02) is smaller than the translation motor (p/n D13393P01/02).

1 Loosen the two (2) fasteners in the front of the motor. The translation motor must be loosened and moved to get to the inside screw of the rotation motor.

2 Disconnect the motor connector from the flex circuit assembly.

3 Tilt the back of the motor up until the fasteners clear the mounting brackets; then slide it back to separate the motor shafts.

4 To replace the motor, reverse the above procedure, making certain that the wires from the motor are turned inward next to the circuit board, and that the alignment washers are seated properly into the brackets.

Replacing the Rotation Motor Extension Shaft

1 With the motor removed, press the coil pin from the motor shaft.

2 Replace the extension shaft and press in a new coil pin.

Replacing the Rotation Motor Drive Shaft

1. With the motor and extension shaft removed, remove the two (2) fasteners securing the drive shaft cover in place.
2. Remove the drive shaft cover.
3. Tilt the back of the drive shaft up, and slide the drive chain from the sprocket.
4. To reinstall the drive shaft, reverse the above procedure, making certain that the anti-rotation feature of the drive shaft bushing locks into the small slot on the top motor mount. (Figure 4-38. Replacing the Rotation Motor Drive Shaft)

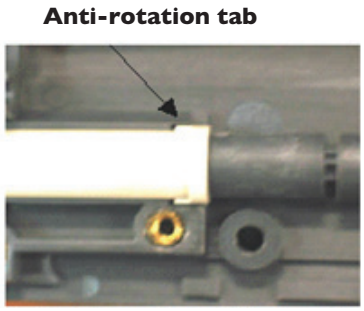

Figure 4-38. Replacing the Rotation Motor Drive Shaft

Replacing the Rear DC Motor (Translation) or Sprocket

Note: The translation motor (p/n D13393P01/02) is larger than the rotation motor (p/n D13392P01/02).

1. Remove the two (2) fasteners securing the top motor mount cover in place; remove cover.
2. Remove the loose hex nut that attaches the power cord assembly.
3. Tilt the back of the translation drive shaft up, and slide the drive chain from the motor sprocket.
4. Loosen the two (2) fasteners in the front of the motor.
5. Disconnect the motor connector from the flex circuit assembly.
6. Remove the motor from the mounting brackets. (Figure 4-39. Replacing the Rear DC Motor (Translation) or Sprocket)

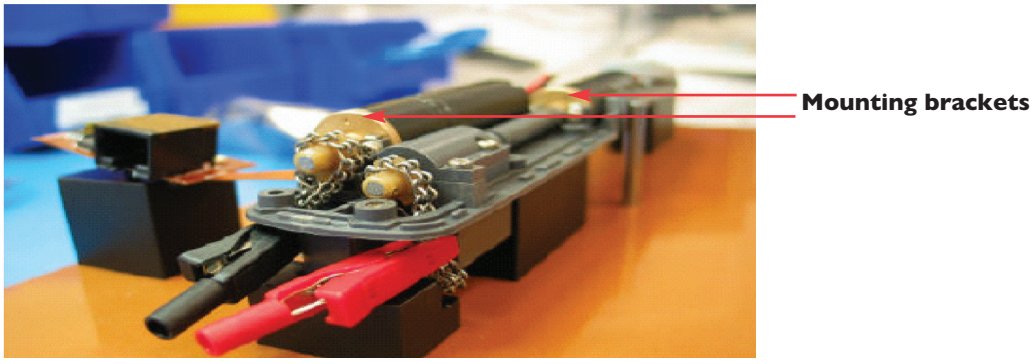

Figure 4-39. Replacing the Rear DC Motor (Translation) or Sprocket

7 Remove the coil pin from the sprocket.

8 Replace the motor or sprocket and press in a new coil pin.

9 To reinstall the motor, reverse the above procedure.

Replacing the Drive Shafts, Bushings, Chains and Sprockets

1 Remove the power cable and the bottom housing.

2 Lift up the flex circuit board to expose the phillips head fasteners.

3 Remove the two (2) fasteners holding the top motor mount cover; remove the cover.

4 Tilt the drive shafts upward at the rear, and remove the drive chains.

5 Remove the drive sprocket shaft assemblies. (Figure 4-40. Sprocket Locations)

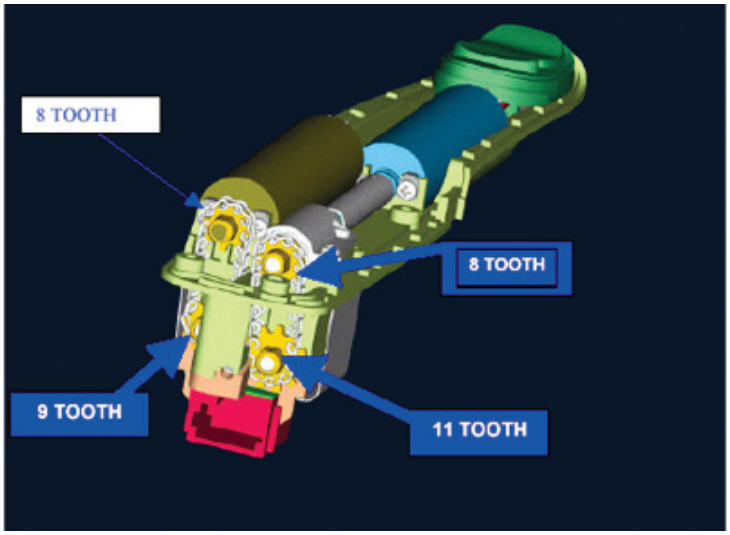

Figure 4-40. Sprocket Locations

6 To replace the drive shaft assemblies, reverse the above procedure. Check the drive chains to make certain that the loops are facing upward. (Figure 4-41. Chain Loops)

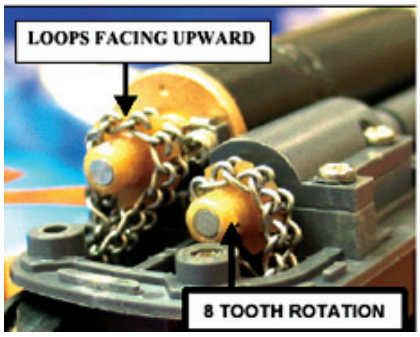

Figure 4-41. Chain Loops

Note: Make certain that the locator tabs on the bushings are turned sideways (9 o'clock and 3 o'clock) so that they lock into the top of the supports. (Figure 4-38. Replacing the Rotation Motor Drive Shaft)

MR Holster Repair and Replacement Procedures

The instructions that follow describe how to remove or replace the following components of the MR Holster:

- Replacing the Remote Keypad
- Replacing the Top Housing
- Removing the Lens PCB Assembly from the Top Housing
- Removing Holster Bottom from the Gearbox Tongue
- Removing the Cable and Strain Relief from the Gearbox Tongue Assembly
- Removing the Input Gears and Cover
- Removing the Encoder from the Gearbox Tongue Assembly
- Removing the Thumbwheel Shaft and Gear
- Servicing the Gearbox Assembly
- Removing the Electrical Cable with Lemo Connector
- Removing the HIB Enclosure
- Removing the HIB PCB
- Removing or Replacing the Drive Cable

Note: If the housing seals are damaged, the housing must be replaced with a new housing that has a pre-applied bead of silicone.

Note: All fasteners should be tightened with a torque driver to 2.0 +/- .5 in-lbs unless otherwise noted.

Note: Reapply GE silicone (TSE397-C) to any location from which it was removed during disassembly (i.e., connectors).

Replacing the Remote Keypad

1. Remove the allen fastener holding the keypad strain relief to the holster (Figure 4-42. Replacing the Remote Keypad).
2. Note the position of the wiring. During reassembly, it must be placed in the same location from which it was removed.
3. Pull cable to the rear to expose the wiring and the Molex connector.
4. Disconnect the connector, and remove the connector from the unit.
5. To reassemble, reverse the disassembly procedure, ensuring that the wires are pushed to the side so when the strain relief is tightened down, it does not pinch them.

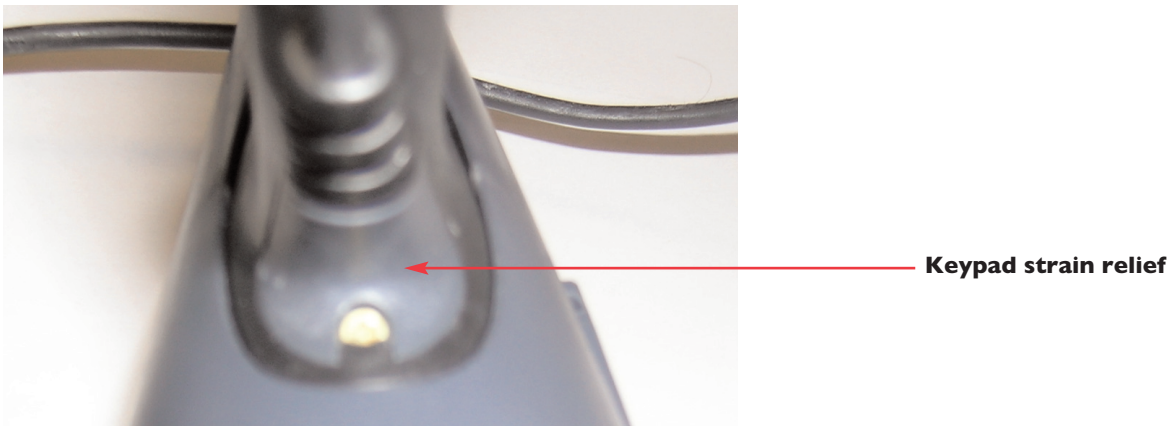

Figure 4-42. Replacing the Remote Keypad

Removing the Top Housing from the Bottom Housing

1. Remove the three (3) allen fasteners in the top of the housing (Figure 4-43. Top Housing and Bottom Housing).
2. Remove the three (3) allen fasteners in the bottom housing holding the top housing to the bottom housing.
3. Unhook the Molex connector and remove from the unit.
4. To reassemble, reverse the above procedure.

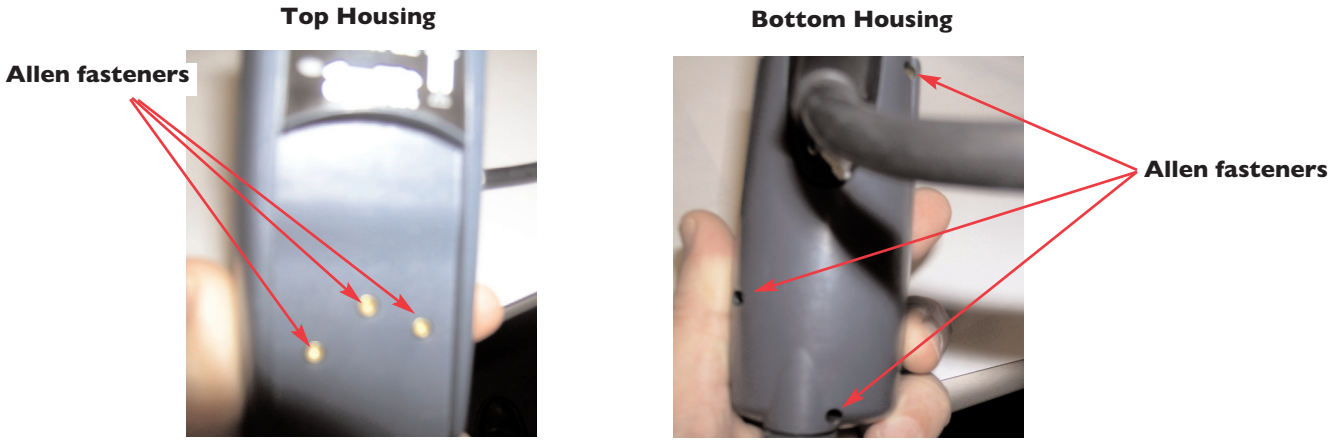

Figure 4-43. Top Housing and Bottom Housing

Removing the Lens PCB Assembly from the Top Housing

1. Remove the top housing.
2. Remove the four (4) allen fasteners holding the containment housing to the top housing (Figure 4-44. Containment Housing and PCB Wire Routing).
3. Remove the containment housing and the PCB assembly.
4. To reassemble, reverse the disassembly procedure.

Note: Make certain that the wires are routed in the channel properly so they are not pinched during reassembly.

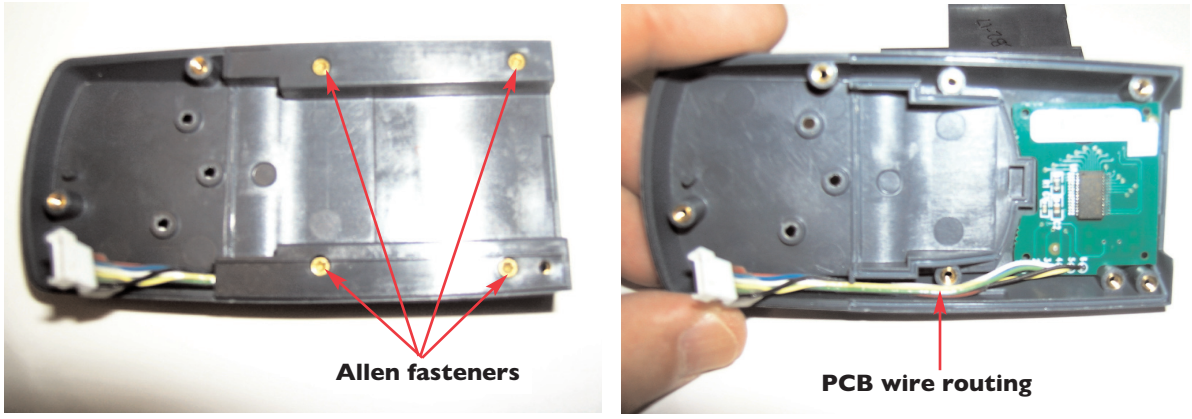

Figure 4-44. Containment Housing and PCB Wire Routing

Removing the Holster Bottom from the Gearbox Tongue

1. Remove the top housing.
2. Loosen allen fastener 5-6 turns on the thumbwheel shaft, and pull the thumbwheel knob to the rear to remove. (tighten fastener back down to keep it from falling out) (Figure 4-45. Thumbwheel Knob and Gearbox Tongue Assembly).
3. Remove the seven (7) allen fasteners holding the gearbox tongue housing to the bottom housing
4. Pull the two (2) housings apart.
5. To reassemble, reverse the disassembly procedure.

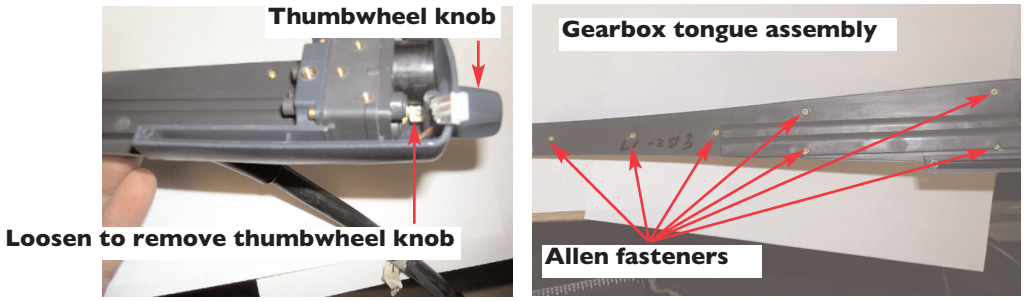

Figure 4-45. Thumbwheel Knob and Gearbox Tongue Assembly

Removing the Cable and Strain Relief from the Gearbox Tongue Assembly

1. Remove the holster bottom from the gearbox tongue.
2. Remove the three (3) allen fasteners from the cable strain relief.
3. Remove the cable attachment housing by removing the five (5) allen fasteners (Figure 4-46. Thumbwheel Knob and Gearbox Tongue Assembly).

   Note: Two (2) of the fasteners are slightly longer than the other three and must be put back in the correct locations.
4. While holding the rubber dampener, slide the drive cable assembly to the rear and remove.
5. Disconnect the power cable from the encoder.
6. To reassemble, reverse the disassembly procedure, ensuring that the wiring harness for the encoder is routed properly.

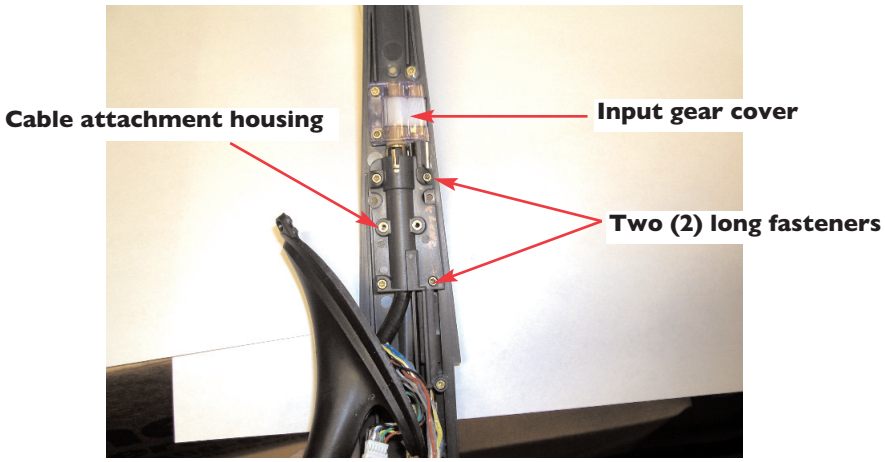

Figure 4-46. Removing the Cable and Strain Relief from the Gearbox Tongue Assembly

Removing the Input Gears and Cover

1. Follow the previous steps to get to the input gear cover.
2. Remove the three (3) allen fasteners holding the input gear cover in place (Figure 4-47. Removing the Input Gears and Cover).
3. Remove the cover, input gears and bushings.
4. Raise the long input shaft slightly to remove all the bushings.

   Note: Do not raise the input shaft too high or it will bend. Do not bend the shaft.
5. To reassemble, reverse the above procedure, ensuring that the bushings are seated properly. Tighten the gear cover fasteners to only 1 in-lbs.

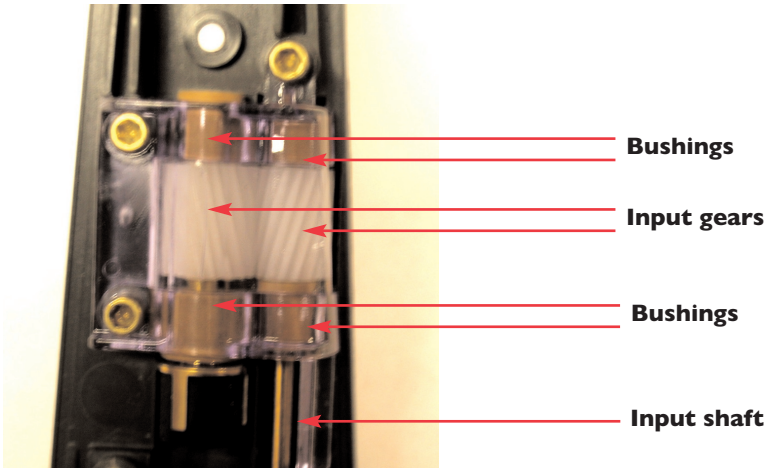

Figure 4-47. Removing the Input Gears and Cover

Removing the Encoder from the Gearbox Tongue Assembly

1. Follow the previous steps to get to the encoder.
2. Remove Kapton tape from the encoder.
3. Remove the plastic rear cover of the encoder by unsnapping and pulling it to the rear.
4. Slide the encoder fork into the 2 small openings on the side of the encoder.
5. With the small dimple on the encoder shaft pointing up at 12 o'clock, insert a .035 allen wrench from the right side into slot at the 3 o'clock position until it seats in the setscrew holding the encoder (Figure 4-48. Removing the Encoder from the Gearbox Tongue Assembly).
6. Loosen the setscrew.

   Note: Do not remove the setscrew.
7. Remove the two (2) allen fasteners holding the encoder then remove the Encoder by sliding it to the rear.
8. Reverse above procedure to reassemble

   Note: Do not over tighten the encoder setscrew; it should just be finger tight.

   Note: The flat of the shaft must be aligned to the setscrew before tightening the setscrew.

   Note: Replace the Kapton tape on the same encoder location from which it was removed in step 2.

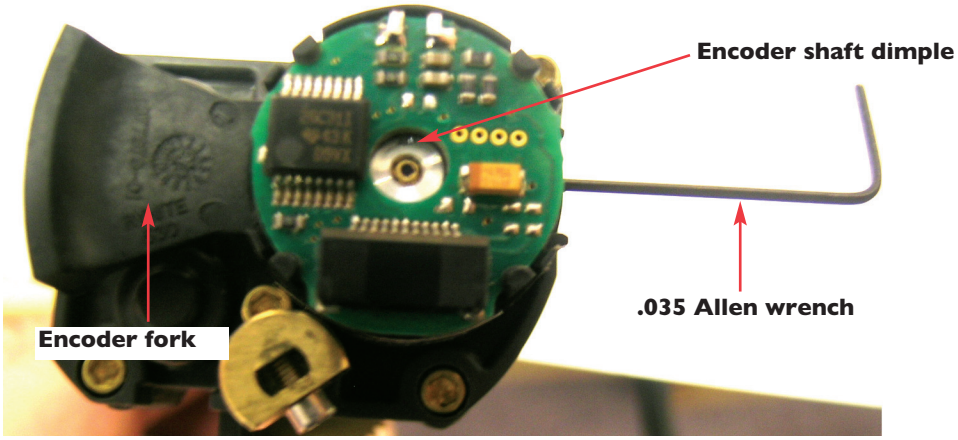

Figure 4-48. Removing the Encoder from the Gearbox Tongue Assembly

Removing the Thumbwheel Shaft and Gear

1. Follow the previous steps to get to the thumbwheel shaft and gear.
2. Remove the coil pin from the shaft and gear.
3. Slide the shaft out from the rear and remove the gear.
4. Reverse above procedure to reassemble

Note: The thumbwheel shaft and gear do not have to be removed to service the gearbox assembly.

Servicing the Gearbox Assembly

1. Follow the previous steps to get to the gearbox assembly.
2. Remove the ratchet cover housing by removing the four (4) allen fasteners.
3. Pull the translation coupling assembly forward and remove (Figure 4-49. Front of Gearbox Housing).
4. Pull the thumbwheel coupling forward and remove.

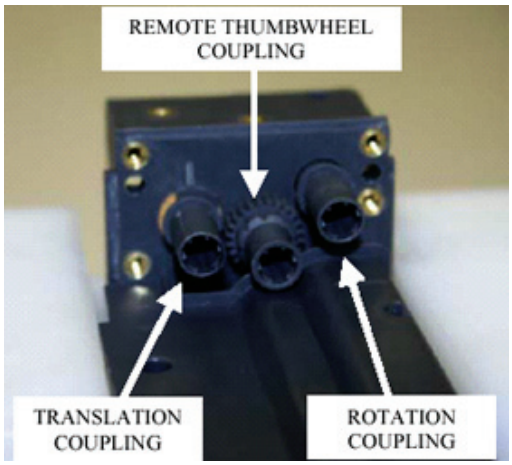

Figure 4-49. Front of Gearbox Housing

5 Remove the four (4) allen fasteners from the back gearbox cover.

6 Pull the cover slightly to the rear and then remove the rotation coupling assembly from the front of the gearbox housing.

7 Rotate the cover down to expose the gearbox gears without removing the thumbwheel shaft (Figure 4-50. Rear of Gearbox Housing).

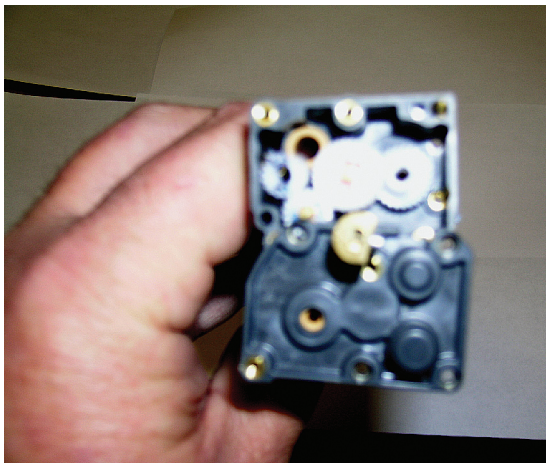

Figure 4-50. Rear of Gearbox Housing

8 Replace gears as needed. (Figure 4-51. Gear Locations)

9 Slide the long transfer shaft to the rear and remove from the assembly.

10 To reassemble, reverse the above procedure.

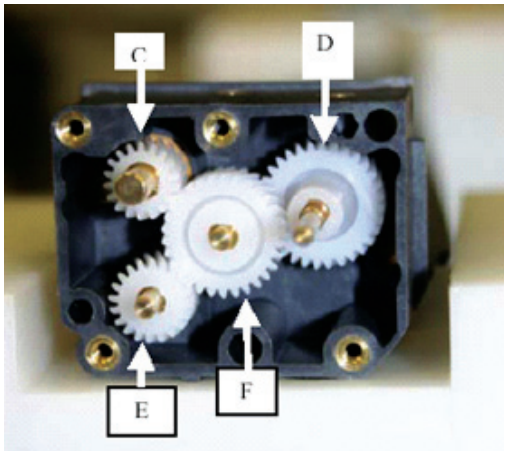

Figure 4-51. Gear Locations

C - 18 Tooth Helical Gear onto Transfer Shaft.

D - 27 Tooth Translational Gear to Translation Engagement Coupling

E - 20 Tooth Proximal Gear to Transfer Shaft.

F - Idler Gear onto Idler Shaft.

Note: Verify that all rotating parts rotate smoothly as the input shaft is rotated.

Removing the Electrical Cable with the Lemo Connector

1. Remove the four (4) allen fasteners holding the cable breakout housings together. (Figure 4-52. Cable Breakout Housing)
2. Remove the top housing half.
3. Unplug the Molex connector and remove cable.
4. To reassemble, reverse the above procedure.

   Note: If both housings are removed, ensure that the cable ferrule aligns into the slot. Ensure that the slot in the brass ferrule drops over the square boss in the housing. Ensure that the round boss inside the housing fits into one of the holes in the back nut.

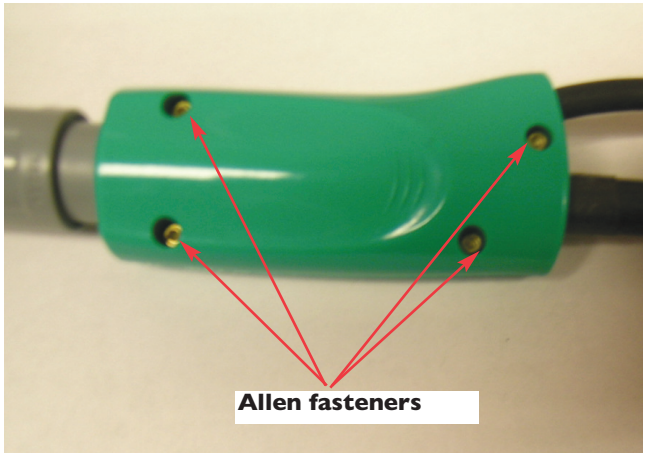

Figure 4-52. Cable Breakout Housing

Removing the HIB Enclosure

1. Unwind the cable from the spool.
2. Remove the three (3) allen fasteners holding the HIB enclosure to the spool. (Figure 4-53. Removing the HIB PCB)
3. Pull the HIB away from the spool.
4. To reassemble, reverse the above procedure. Tighten the three (3) Allen fasteners from 4 to 6 in-lbs. until the fasteners bottom out to the backplate.

Removing the HIB PCB

1. Remove the HIB enclosure.
2. Unplug the two (2) Molex connectors from the PCB board.
3. Remove the two (2) allen fasteners holding the PCB to the HIB enclosure. (Figure 4-53. Removing the HIB PCB)
4. Remove the PCB from the enclosure.
5. To reassemble, reverse the above procedure.

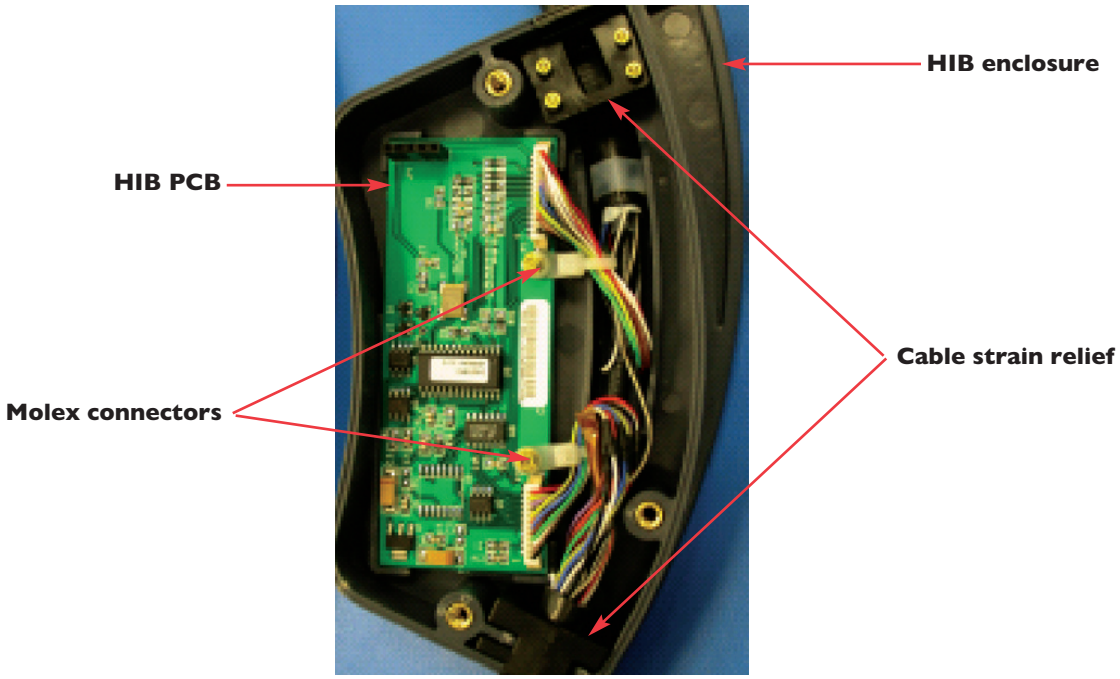

Figure 4-53. Removing or Replacing the Drive Cable

Removing or Replacing the Drive Cable

1. Remove the HIB enclosure.
2. Remove the four (4) allen head fasteners from the cable strain relief. (Figure 4-53. Removing or Replacing the Drive Cable)
3. Disconnect the Molex connectors from the PCB.
4. Remove the cable from the HIB enclosure.
5. To reassemble, reverse the above procedure.

Support Arm Repair and Replacement Procedure

The support arm consists of a table brace and clamp, quick connectors for easy assembly, a flexible tube for adjusting positioning, and a coil for supporting the cables.

To disassemble the support arm for repair (Figure 4-54. The Support Arm):

1. Remove the cable support coil from the flexible arm by releasing the quick connector that connects the coil and the arm.
2. Remove the flexible arm from the table brace by releasing the quick connector that connects the arm to the brace.
3. Unthread the clamp and table brace from the examination table by turning the clamp knob counterclockwise.
4. Reassemble the support arm, replacing worn or damaged components.

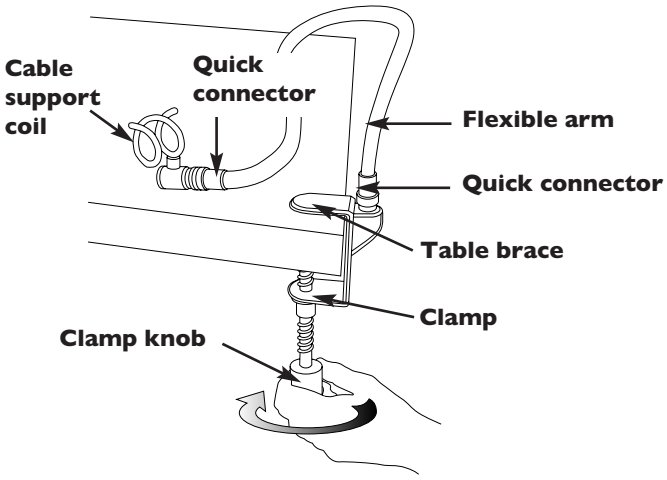

Figure 4-54. The Support Arm

Cart Assembly Repair and Replacement Procedures

This section describes how to replace the following cart assembly components:

- Cart handle
- Holster receptacle and bracket
- Power cord wrap posts
- Casters
- Cart door latch
- Cart door and hinges
- Pull-out drawer guides
- Fastener plate

Replacing the Cart Handle

1. Remove the four (4) 1/4-20 serrated allen head fasteners from the handle mounts with the 3/8" box wrench supplied with the cart. (Figure 4-55. Replacing the Cart Handle)
2. Remove the handle from the handle mounts.
3. Slide the new handle into the two handle mounts on either side of the cart.
4. Line up the two (2) nuts located in the bottom of the handle with the slots on the underside of the handle mounts.
5. Fasten the handle with four (4) 1/4-20 serrated allen head fasteners and the 3/8" box wrench.

   Note: **Do Not** fully tighten the fasteners until all fasteners have engaged the bottom of the handle.
6. Torque each allen head fastener to 200 in.-lbs.

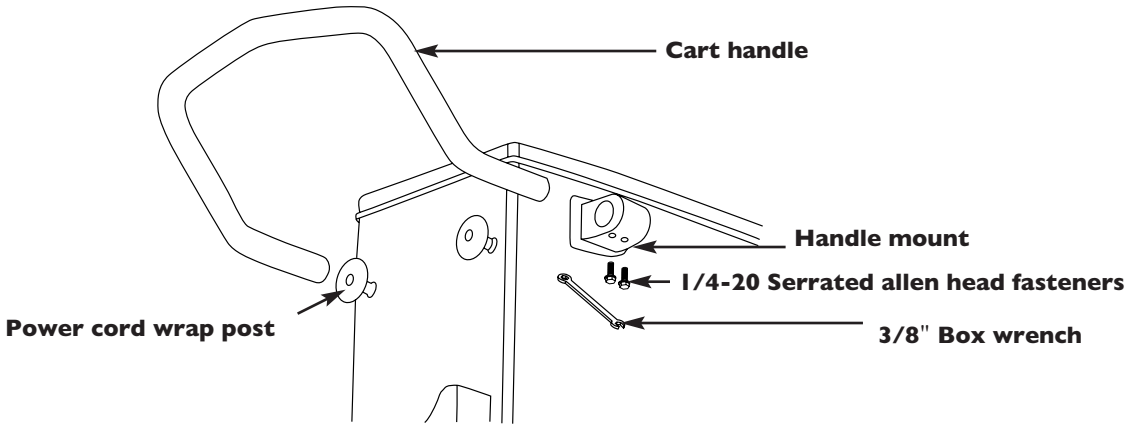

Figure 4-55. Replacing the Cart Handle

Replacing or Relocating the Holster Receptacle and Bracket

The cart has slots on either side to accept the receptacle bracket, allowing for right or left mounting of the holster receptacle. To replace or relocate the receptacle bracket (Figure 4-56. Replacing or Relocating the Holster Receptacle and Bracket):

1. Remove the two (2) #10-32 flange nuts securing the bracket in place with the 3/8" box wrench supplied with the cart.
2. Remove the bracket.
3. Remove the holster receptacle from the bracket (only necessary if the holster receptacle will not be replaced) by removing the two #4-40 button socket head cap screws with the 1/16" allen wrench supplied with the cart.
4. Place the receptacle bracket into the slot on either side of the cart near the top surface.

   Note: The cart has studs to accept the slotted holes in the bracket. The bracket must be tipped at an upward angle and placed through the slot in order to clear the bottom of the studs.
5. Tighten the two (2) #10-32 flange nuts with the 3/8" box wrench.
6. Place the new holster receptacle on the receptacle bracket.
7. Fasten the holster receptacle to the bracket with the two (2) #4-40 button socket head cap screws and 1/16" allen wrench.

   Note: **Do Not** overtighten.

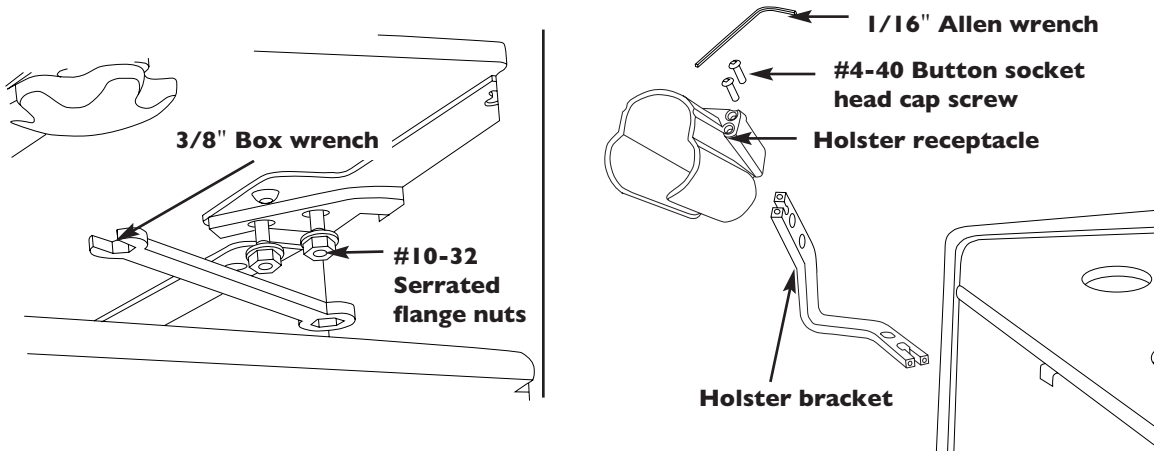

Figure 4-56. Replacing or Relocating the Holster Receptacle and Bracket

Replacing the Power Cord Wrap Posts

1 Remove the power cord from the wrap posts.

2 Remove the allen head fastener inside the damaged post(s).

3 Remove the damaged post(s).

4 Install the new post(s).

Replacing a Caster

1 Remove power from the control module.

2 Disconnect the holster from the control module.

3 Remove the holster from the holster receptacle and store in a safe place temporarily.

4 Open the cart door, and remove all items from inside the cart.

5 Inside the cart, locate the locking knobs that secure the control module to the top of the cart.

6 Turn the locking knobs to the left (counter-clockwise) until you can easily remove the control module from the top of the cart.

7 Remove the control module from the top of the cart. Rubber pads on the bottom of the control module fit into indentations on the top of the cart.

8 Store the module in a safe place temporarily.

9 Close the cart door.

10 Rest the cart on one side, exposing the four casters. Protect the handle and the holster, receptacle, and bracket by wrapping with a clean cloth. (Figure 4-57. Replacing a Caster)

11 Lock casters in place, making certain that the wheels do not prevent access to any of the serrated flange allen head fasteners securing the casters to the base plate.

12 Loosen and remove the serrated flange allen head fasteners with a 3/8" allen wrench.

13 Replace the caster(s), making certain that the locking mechanism faces the front of the cart.

Note: The steer lock casters are mounted at the rear of the cart below the handle mounts; the total lock casters are mounted in front of the cart.

14 Torque each allen head fastener to 20 in.-lbs.

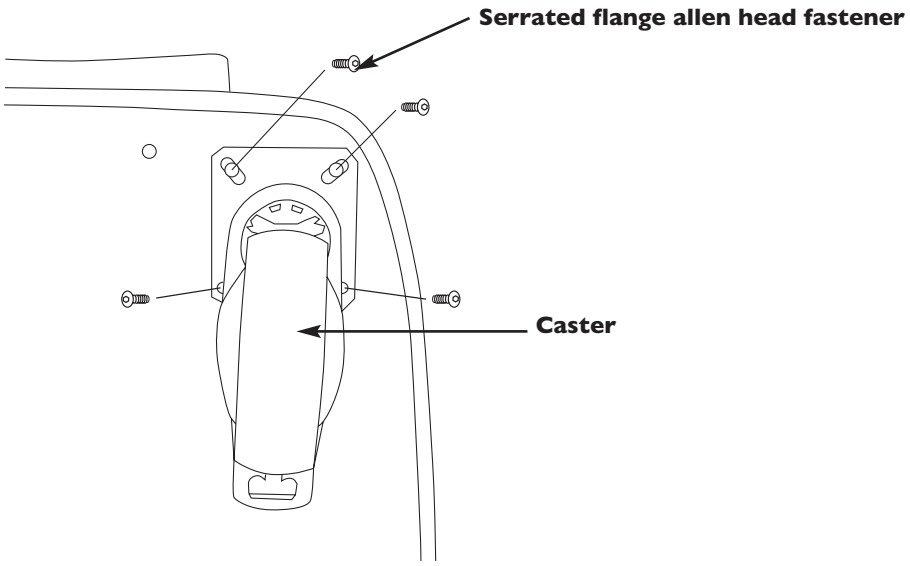

Figure 4-57. Replacing a Caster

Replacing the Cart Door Latch

1. Open the cart door.
2. Remove the female portion of the latch from the door back panel by loosening and removing the two phillips head fasteners.
3. Replace the female portion of the latch, securing it with two phillips head fasteners.

   Note: Apply a drop of Loctite® 242® on the threads of each fastener before securing the latch.
4. Remove the latch bracket from the left wall weldment by loosening and removing the two phillips head fasteners.
5. Replace the latch bracket, securing the two (2) phillips head fasteners.

Replacing the Cart Door and Hinges

1. Open the cart door.
2. While steadying the cart door, remove the four (4) phillips head fasteners (two for each hinge) securing the door hinges to the side of the cart.
3. Remove the cart door.
4. Remove the remaining phillips head fasteners securing the hinges to the door.
5. Remove the hinges from the door.
6. Replace the hinges, securing them first to the door.
7. Fasten the door to the cart by securing the other side of the hinges with phillips head fasteners.

Replacing the Pull-Out Drawer Guides

1. Open the cart door.
2. Remove the pull-out drawer by pressing the black release levers on the side of the drawer and removing the drawer from the guides. (Figure 4-58. Replacing the Pull-Out Drawer Guides)
3. Loosen and remove the three (3) phillips head fasteners that secure each guide to the inside of the cart.

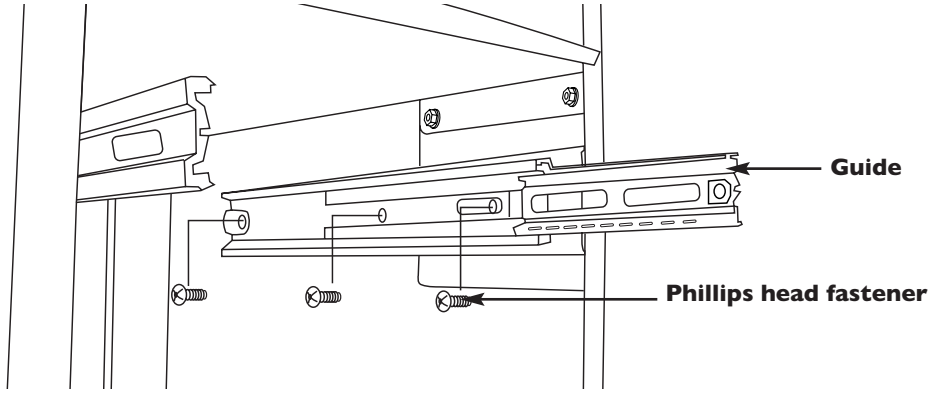

Figure 4-58. Replacing the Pull-Out Drawer Guides

4 Replace the guides and secure with phillips head fasteners.

5 Reinstall the drawer.

6 Close the door.

Replacing the Fastener Plate

1 Open the cart door.

2 Empty the top shelf inside the cart.

3 Using a short-handled phillips head screwdriver, loosen and remove the four (4) fasteners that secure the fastener plate to the underside of the cart top. (Figure 4-59. Replacing the Fastener Plate)

4 Loosen the two knobs until the entire assembly that includes the fastener plate, two knobs, and two e-clips can be removed.

5 Replace the entire assembly.

6 Close the cart door.

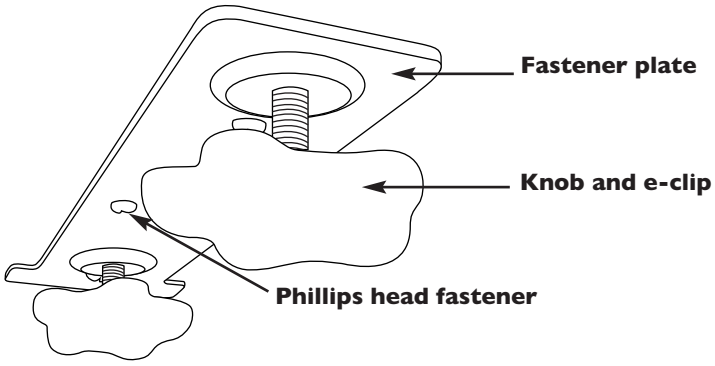

Figure 4-59. Replacing the Fastener Plate

Introduction

The following upgrades should be inspected for and performed, as required, on the MAMMOTOME Control Module (SCM12 & SCM23).

Part / Assembly	Original Condition	Upgrade to	Requirement
Software	Hand Held (any version 3.0 and prior)	v4.1 or higher. For installation instructions, refer to the MAMMOTOME Software Installation Guide (p/n P40491P01) with the SCMSW5 software.	Mandatory
Software	Stereotactic (any version 2.0 and prior)	v4.1 or higher. For installation instructions, refer to the MAMMOTOME Software Installation Guide (p/n P40491P01) with the SCMSW5 software.	Mandatory
Regulatory Label	p/n 880-000360 or p/n 880-000389 without a heart symbol in the upper left-hand area of the label	Remove existing label and replace with p/n D06239P02.	Mandatory
Ground Wire Hardware	See Ground Wire Installation instructions in this chapter.	See Ground Wire Installation instructions in this chapter.	Mandatory
Warranty Label	No label present	Place label (p/n 3432.325) over one screw under the front bezel.	Mandatory
Uniboard	All Uniboards 3432.007 ECN 017789 or earlier	See Uniboard Upgrade instructions in this chapter.	Mandatory
Pump Wiring	Wires not routed under the power supply bracket	See Routing of Pump Wiring instructions in this chapter.	Mandatory
Vacuum Pump and Isolation Mounts	See Change in Vacuum Pump and Components instructions in this chapter.	See Change in Vacuum Pump and Components instructions in this chapter.	As needed
Vacuum Tubing	See Vacuum Tubing Upgrade instructions in this chapter.	See Vacuum Tubing Upgrade instructions in this chapter.	Mandatory
DC Motor Adapter	See DC Motor Adapter Upgrade instructions in this chapter.	See DC Motor Adapter Upgrade instructions in this chapter.	Domestic - Mandatory; Int'l - As needed
Regulatory Label	See Regulatory Label Upgrade instructions in this chapter.	See Regulatory Label Upgrade instructions in this chapter.	Mandatory

EX Upgrade	See EX Upgrade instructions in this chapter.	See EX Upgrade instructions in this chapter.	On request.
MR Cart Upgrade	See MR Cart Upgrade instructions in this chapter.	See MR Cart Upgrade instructions in this chapter.	MR system installation

Note: Upgrade requirements are defined as follows:

- As Needed: This upgrade should only be performed if the affected part or assembly has failed.
- Upon Request: This upgrade should only be performed if specifically requested by the customer.
- Mandatory: This upgrade must be performed if the unit is not already in the upgraded configuration

The following upgrades should be inspected for and performed, as required, on the Stereotactic Holster (STHC1).

Part / Assembly	Original Condition/Upgrade to	Requirement
Rear Thumbwheel Assembly	See Replacing the ST Holster Rotation Knob instructions in this chapter.	Mandatory
Spade and Coupling Assembly	See Replacing the ST Holster Rotation instructions in this chapter.	Mandatory
Coil Pin Replacement	See Coil Pin Replacement instructions in this chapter.	Mandatory

Ground Wire Installation

Inspection Criteria

- Units in need of this upgrade will have an #8-32 x 1/2" long screw running down through the chassis fastening two ring terminals.
- The ground screw is located in the rear of the unit as depicted in Figure 5-1. Ground Screw Location.

Upgrade Instructions

Install parts in the following sequence (See Figure 5-2. Installing the Ground Wire):

- Screw (p/n 700-001638)
- Lockwasher (p/n 705-000025-01)
- Small ground cable from power supply
- Nut (p/n 700-001660)
- Lockwasher (p/n 705-000025-01)
- Large ground wire from back panel
- Lockwasher (p/n 705-000025-01)
- Nut (p/n 700-001660)

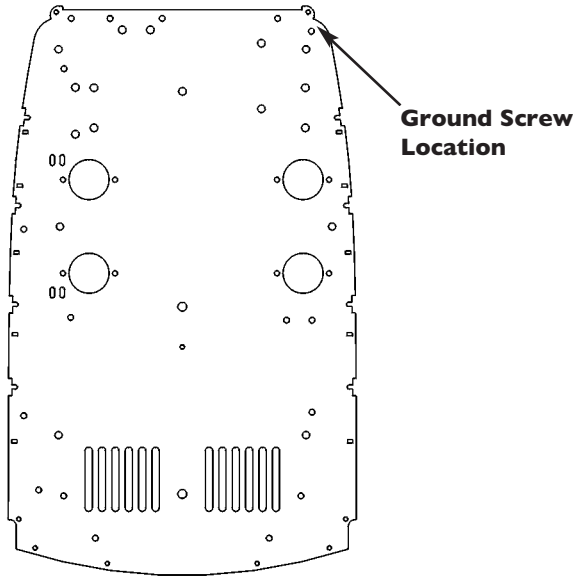

Figure 5-1. Ground Screw Location

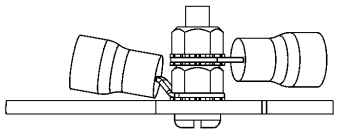

Figure 5-2. Installing the Ground Wire

Uniboard Upgrade

This upgrade addresses a power-up condition with the Mammotome Control Module. When power is first applied, only the fan turns on; the user must then cycle the power off then back on to power up the control module.

Inspection Criteria

All SCM12/SCM23 Uniboard PCB assemblies with an ECN number of 017789 or lower must receive the following rework.

Material/Equipment Required

- 30 AWG Solid Teflon Wire
- Two (2) 10 kΩ Resistors
- Loctite 454 (Accelerator 712)
- Solder and soldering iron

Upgrade Instructions

1 Following the instructions in **Chapter 4** of the MAMMOTOME Service Manual, remove the Uniboard.

2 Add two (2) 10 kΩ resistors to J3. One resistor shall be soldered directly to the top pad in the second column, which is in the first row of J3 (from the Top Left side of the Uniboard). The second resistor shall be added directly to the bottom pad in the second column, which is in the second row of J3 (refer to Figure 1 below for proper orientation).

3 Obtain a 30 AWG Solid Teflon Wire and trim to size to route from the (+) Positive post of C90 to both 10 kΩ resistors (opposite side of J3 connection). The insulation on the wire will need to be stripped at both ends and in the middle where it will contact the center resistor (See Figure 5-3. Upgrading the Uniboard for proper orientation).

4 Add two drops of Loctite 454 (Accelerator 712) to the PCB, to secure the rework.

5 Reinstall the Uniboard according to **Chapter 4** of this manual.

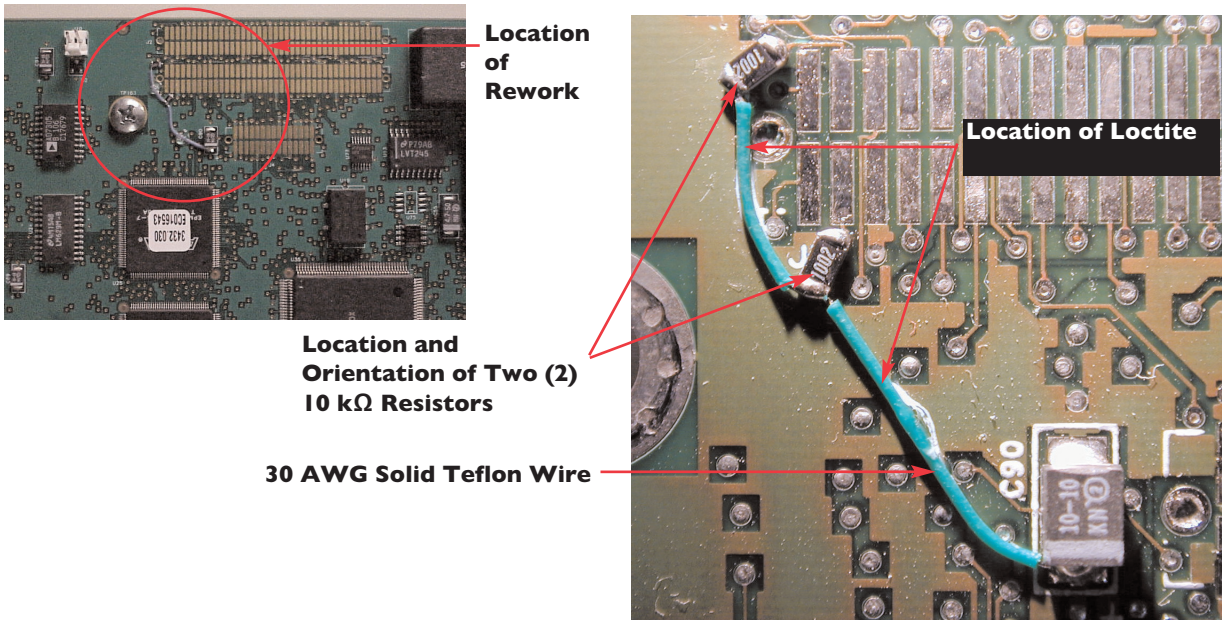

Figure 5-3. Upgrading the Uniboard

Routing of Pump Wiring

Vibration from the vacuum pump translates through the pump wires and can result in the insulation of the wires rubbing off if they contact a sharp surface, such as the edge of the power supply bracket. This routing of the pump wires secures both wires away from the edges of the power supply bracket.

Inspection Criteria

Inspect the routing of the brown and blue wires supplying power to the vacuum pump. If the brown and blue wires are not secured to the pemstud on the power supply bracket with a tie-strap, then this upgrade must be performed.

Material/Equipment Required

- Tie strap

Upgrade Instructions

1 The brown wire from the pump (plugged into relay tab #2) is routed under the power supply bracket and behind the pemstud (See Figure 5-4. Routing of Pump Wiring).

2 The blue wire from the pump (blue neutral wire from the back panel and plugged in to pin 2 of P1 of the power supply) is routed under the power supply bracket and behind the pemstud (See Figure 5-4. Routing of Pump Wiring).

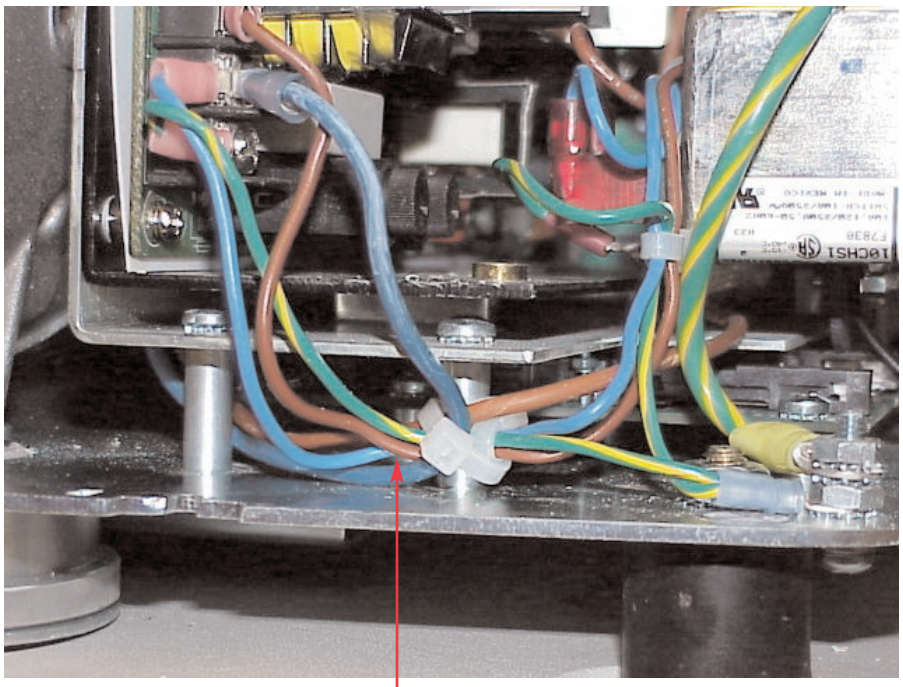

Figure 5-4. Routing of Pump Wiring

Change in Vacuum Pump and Components

Part Number	Part Description	For Use With	Special Instructions
875-000303	Old Vacuum Pump model #2639VGH44-337A	All SCM23s	Existing inventory should be depleted prior to transitioning to p/n 875-000302.
875-000336	New Vacuum Pump model #2669VES44-337	All SCM12s	Existing inventory of pumps (model # K48ZZDZH3250) should be depleted first.
875-000302	New Vacuum Pump model #2669VGH144-337	All SCM23s	Existing inventory of pumps (model # 2639VGH44-337A) should be depleted first.
700-001500	New Pump Isolation Mount	All versions of pumps for SCM12 and SCM23	All 4 isolation mounts must be the same version.
700-001930	7/16 Size 1/2" ID 1-1/4" OD 5/64" Thick, Round Flat Washer, Zinc Plated	New Pump Isolation Mount (p/n 700-001500)	Additional washer placed before the fender washer (Refer to step 5).
700-000396-2	8-32 x 3/8" Phillips Pan Head SEM Screw for LCD Turntable	New vacuum pumps (model #2669VES44-337 or 2669VGH144-337)	Refer to step 15.
700-001529	1/4-20 x 1-1/2" Black Oxide Hex Drive Button Head Screw	Old Vacuum Pumps (model # K48ZZDZH3250 or 2639VGH44-337A)	Remaining inventory should be scrapped and replaced with p/n 3432.367.
3432.367	1/4-20 x 1-1/2" Stainless Steel Torx Drive Button Head Screw with pre-applied epoxy	Old Vacuum Pumps (model # K48ZZDZH3250 or 2639VGH44-337A)	Single use screw that must be discarded when removed.
3432.366	1/4-20 x 1-1/4" Stainless Steel Torx Drive Button Head Screw with pre-applied epoxy	New Vacuum Pumps (model #2669VES44-337 or 2669VGH144-337)	Single use screw that must be discarded when removed.
700-001929	90° Elbow Adapter	New Vacuum Pumps (model #2669VES44-337 or 2669VGH144-337)	Provides additional clearance for the tubing.

Description of Changes in the Isolation Mount

The isolation mount was changed to allow for more clearance with the new pump. The new mount is for use with all versions of the vacuum pump, part numbers 875-000336, 875-000303 and 875-000302. The new mount requires the addition of a 7/16 Size 1/2" ID 1-1/4" OD 5/64" thick, round flat washer (p/n 700-001930) before the fender washer to allow for clearance of the pump mount bolt. Units must have all four (4) of the same version of the mount; the mounts are not interchangeable on a unit due to differences between the two versions of mounts.

Description of Changes in the Pump Mount Screws

The screws used for securing the isolation mounts to the pump were modified to:

- Standardize the application of a thread locker material that prevents the fastener from loosening due to both the vibration and heat induced by the vacuum pump.
- Improve the strength of the fastener head by changing to a torx drive that would minimize “stripping” of the fastener head while tightening the fastener to 120 in-lbs.

The new fasteners (p/n 3432.366 and p/n 3432.367) with the pre-applied epoxy do not require the application of Loctite. They can be distinguished from the older screws by both a change in the head of the fastener (hex vs. torx drive) and a change in material (black oxide vs. stainless steel). The new and old fasteners are interchangeable on both the SCM12 and SCM23 control module unit models. There is no requirement to replace all four (4) fasteners on a unit when one is changed. Fasteners will only be replaced if inspection reveals that they have loosened or are defective. Due to the single-use feature of the pre-applied epoxy, once the new fastener (p/n 3432.366 or p/n 3432.367) is removed, it must be discarded and replaced with a new part.

Disposition of Old Vacuum Pump and Related Components

Remaining inventory of older vacuum pumps will be depleted prior to transitioning to the new pump (pumps can be distinguished by the model number labeled on the pump – older pumps are labeled with model number K48ZZDZH3250 for 115V and 2639VGH44-337A for 230V). Inventory of the old fastener (p/n 700-001529) will be scrapped and replaced with the new fastener (p/n 3432.367). The fastener of length 1-1/2" (p/n 700-001529 and p/n 3432.367) is only for use with the older vacuum pump. Due to a height increase with the new pump, this longer fastener has a possibility of extending through the base of the casting and contacting the pump.

Procedures for Installing New Pump and Components

1 Remove old pump according to the instructions in **Chapter 4** of this manual.

2 Place the new pump (new pump can be identified by the model number located on the pump – 2669VES44-337 for 115V or 2669VGH144-337 for 230V) over the mounting pads, ensuring that the intake port is the closest port to the uniboard.

3 Insert the stem of the rubber isolation mount (p/n 700-001500) into the bottom of the base plate and align with the base of the pump.

4 Cover isolation mount with the existing pump constraint (3432.087) and temporarily secure both the pump constraint and the isolation mount to the chassis with two 6-32 x 1-1/8" Phillips flat head screws (p/n 700-001576). This step will help to hold both the isolation mount and pump constraint in place until secured in a later step.

5 Place a small washer (p/n 700-001930) inside the pump constraint well.

Note: Ensure the smaller washer remains centered on the isolation mount when securing the mount to the pump. If this washer becomes off-center, a noticeable rattling noise will occur when the unit is functionally tested (See Figure 5-5. Isolation Mount Washer).

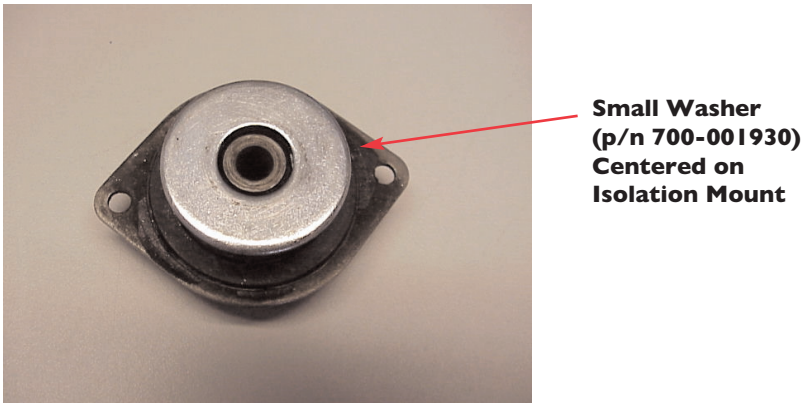

Figure 5-5. Isolation Mount Washer

6 Place a fender washer (p/n 700-001512) on top of the small washer (See Figure 5-6. Installing a New Vacuum Pump).

7 Secure the pump and two washers with a 1/4-20 x 1-1/4" torx drive button head stainless steel fastener with pre-applied epoxy (p/n 3432.366) and torque to 120 in/lbs ± 5 in-lbs.

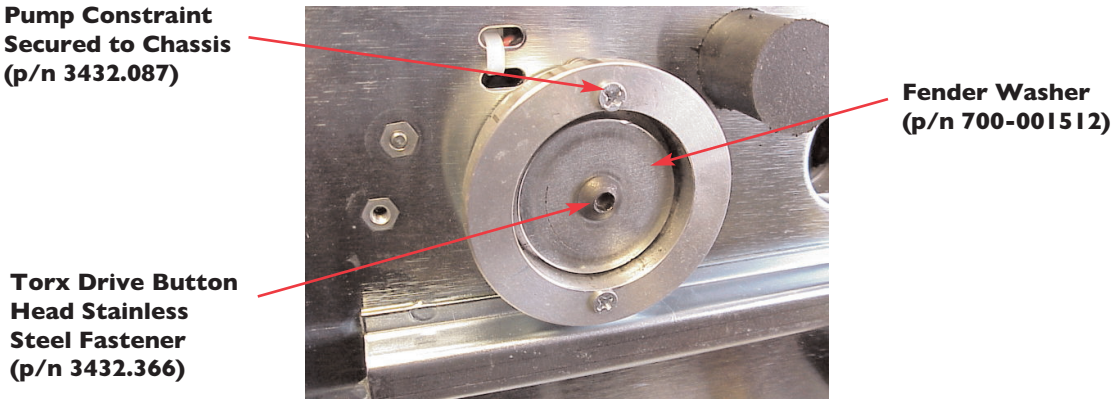
Pump Constraint Secured to Chassis (p/n 3432.087)
Fender Washer (p/n 700-001512)
Torx Drive Button Head Stainless Steel Fastener (p/n 3432.366)

Figure 5-6. Installing a New Vacuum Pump

8 Remove one of the two 6-32 x 1-1/8" Phillips flat head screws (700-001576) holding the pump constraint (See Figure 5-7. Installing the Vacuum Pump Constraint Cover).

9 Place pump constraint cover (3432.129), with countersink holes facing up, on top of pump constraint. Screw one 6-32 x 1-1/8" Phillips flat head fastener (700-001576) into the base plate.

10 Remove the second 6-32 x 1-1/8" Phillips flat head fastener and align the other countersunk hole on the pump constraint cover over the pump constraint.

11 Screw the second 6-32 x 1-1/8" Phillips flat head fastener into the pump constraint cover and torque both screws to 14 in-lbs. ± 1 in-lb.

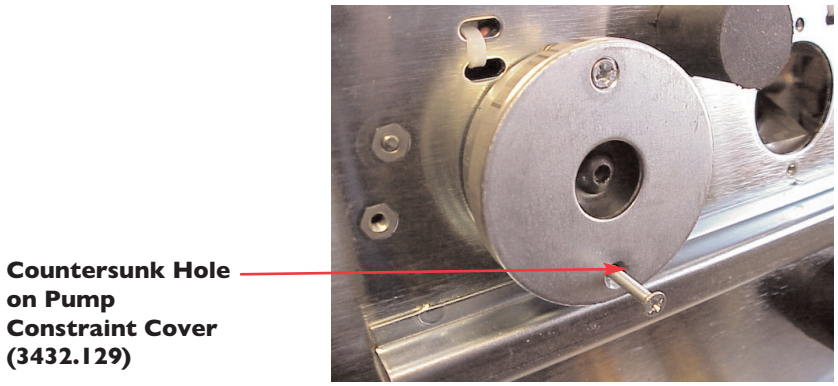

Figure 5-7. Installing the Vacuum Pump Constraint Cover

12 Repeat steps 3 through 11 to install the remaining pump components.

13 Complete the installation of the pump according to the instructions in **Chapter 4** of this manual.

14 On the inside of the main housing, add a 90˚ Elbow Adapter (p/n 700-001929) to the bulkhead fitting

Note: Placement orientation of the 90˚ elbow Adapter is extremely important; See Figure 5-8. 90˚ Elbow Adapter Placement).

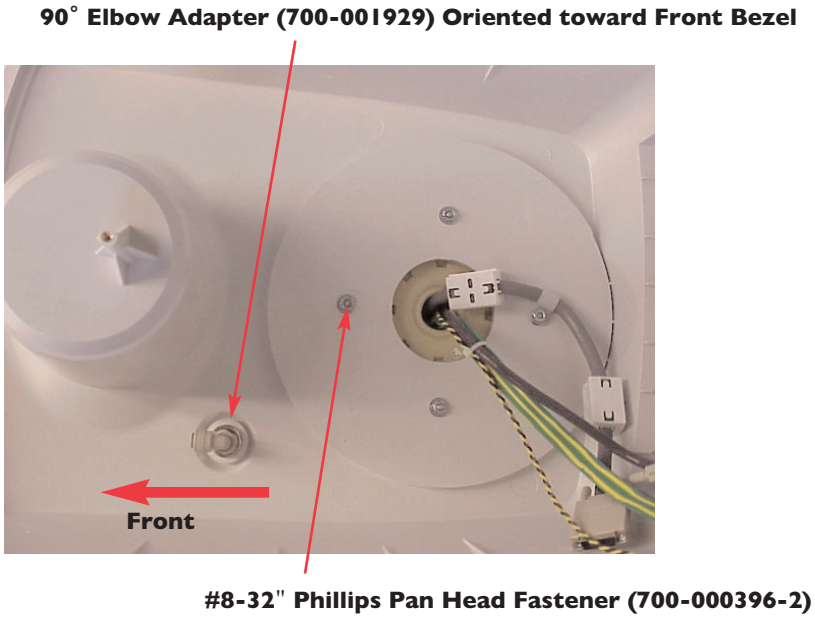

Figure 5-8. 90˚ Elbow Adapter Placement

15 On the LCD assembly, replace one of the #8-32 x 1/2" Phillips Pan Head Fastener (p/n 700-001496) with an 8-32 x 3/8" Phillips Pan Head Fastener (p/n 700-000396-2). This fastener is located toward the front of the LCD Assembly; the change allows sufficient clearance so that no contact is made with the top of the pump (See Figure 5-8. 90˚ Elbow Adapter Placement for identification of the correct fastener to change).

16 Reassemble the control module as described in **Chapter 4** of this manual.

Vacuum Tubing Upgrade

The purpose of this modification is to reduce the opportunity for the vacuum tubing to rub against the inside of the canister well of the main housing, therefore resulting in additional noise within the MAMMOTOME Biopsy System.

Inspection Criteria

A visual inspection is all that is required to determine if the unit already has the modification. After removing the bezel and main housing, inspect for the presence of the 90˚ Elbow Adapter (p/n 700-001929) and verify that the end of the vacuum tubing is 4.5" in length (See Figure 5-9. Vacuum Tubing Upgrade).

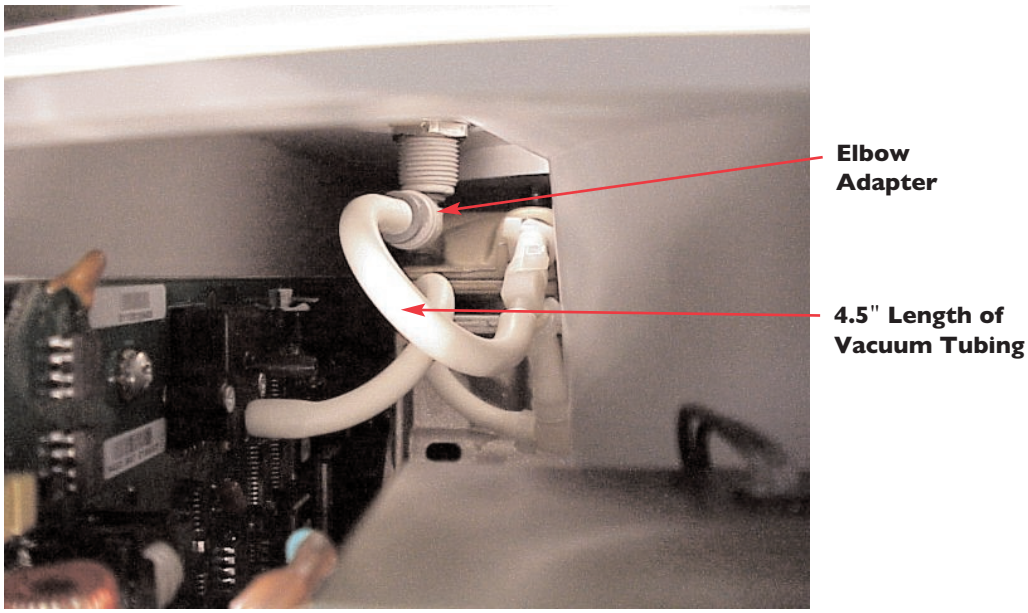

Figure 5-9. Vacuum Tubing Upgrade

Upgrade Instructions

1. Remove bezel and main housing.
2. Remove tie-strap and vacuum tubing from the T-connector (refer to picture above, only the tubing identified as 4.5" in length should be removed in this step).
3. Inspect tubing to determine the presence of “rubbing” and annotate this in the service record of the device (See Figure 5-10. Inspecting the Tubing).

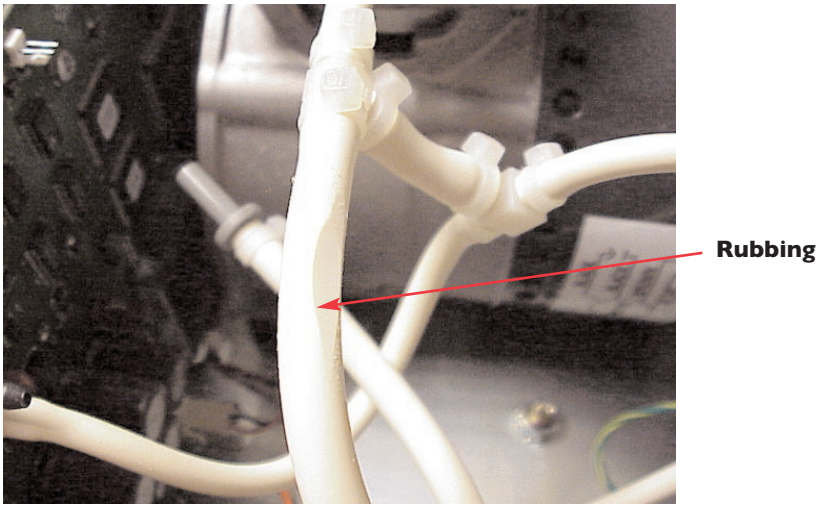

Figure 5-10. Inspecting the Tubing

4 Cut the original tubing to 4.5" in length (See Figure 5-11. Cutting the Original Tubing for proper measurement).

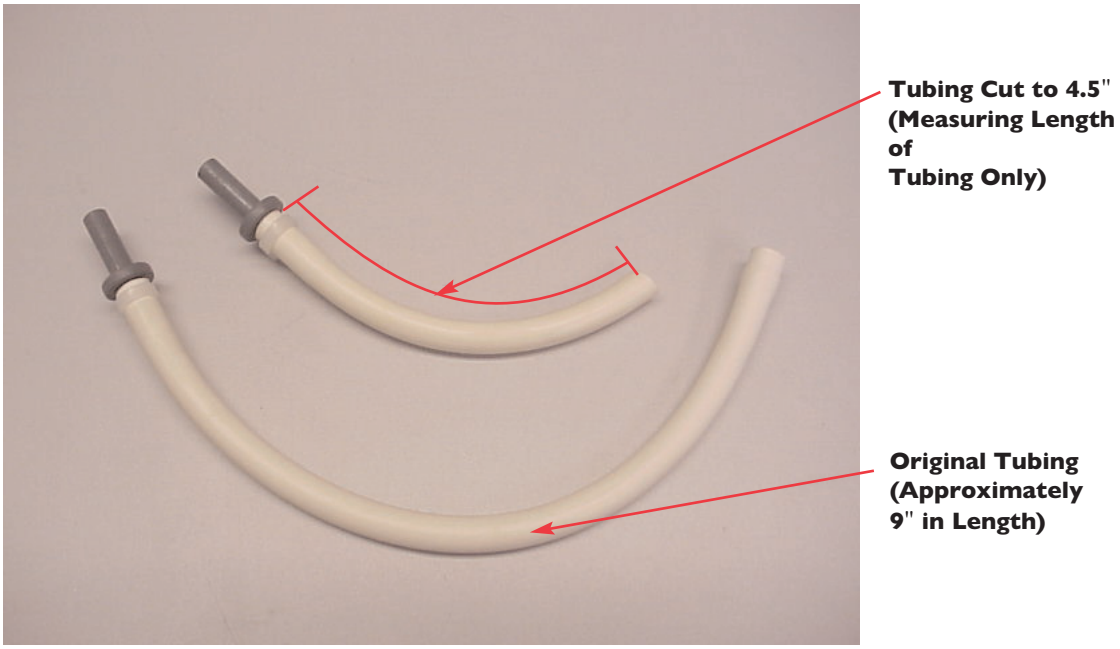

Figure 5-11. Cutting the Original Tubing

5 Reattach the tubing to the T-connector and secure with a tie-strap (p/n 920-000036) (refer to Figure 5-12. Reattaching the Tubing for proper orientation).

Note: Due to the memory properties of the tubing, proper orientation on the T-connector is critical to prevent the tubing from bending when reattached to the bulk head union.

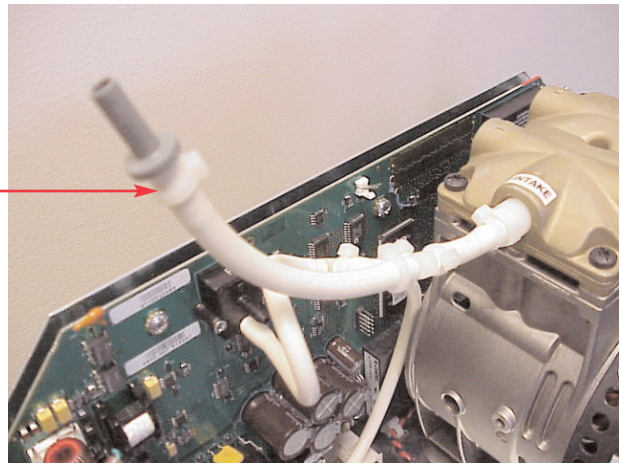

Figure 5-12. Reattaching the Tubing

6 Obtain a 90˚ Elbow Adapter (p/n 700-001929) (if it is not already installed in the control module) and place it in the underside portion of the bulk-head union, with the valve oriented away from the vacuum pump (See Figure 5-13. 90˚ Elbow Adapter Placement for proper orientation).

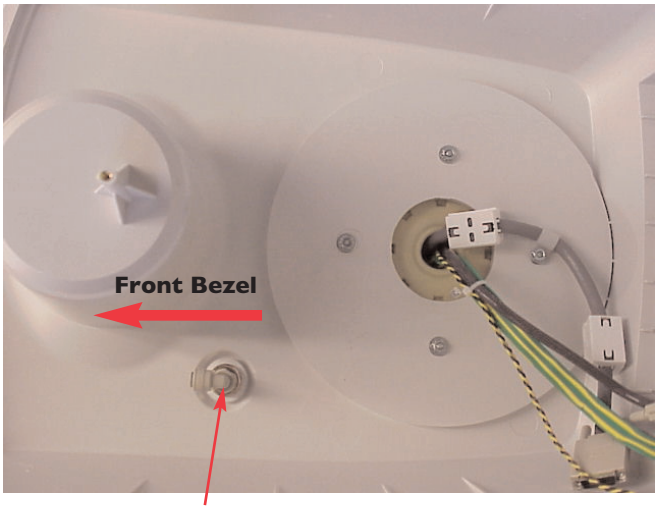

Figure 5-13. 90˚ Elbow Adapter Placement

7 Reattach the main housing to the base plate.

8 Insert the end of the vacuum tubing into the 90˚ Elbow Adapter. When completed, the tubing should be oriented as shown in Figure 5-14. Vacuum Tubing Orientation (no portion of the tubing should touch either the inside of the canister well or the Uniboard).

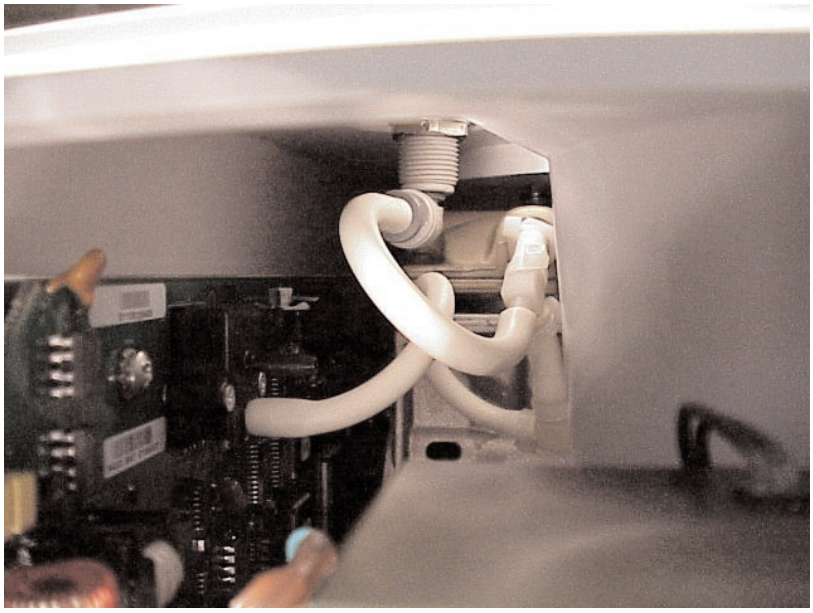

Figure 5-14. Vacuum Tubing Orientation

9 Complete the reassembly of the control module according to the instructions in **Chapter 4** of this manual.

Replacing the ST Holster Rotation Knob

1 Disassemble the ST Holster (see **Chapter 4** of this manual for instructions) and remove the top frame (p/n TFSA200).

2 Obtain part number TFSA200B (top frame with pre-drilled hole; See Figure 5-15. Assembling the Firing Latch Block and Safety Latch to the Top Frame) that will replace the existing top frame (p/n TFSA200).

3 Assemble the firing latch block and safety latch to the new top frame (p/n 3703.255), as shown in Figure 5-15. Assembling the Firing Latch Block and Safety Latch to the Top Frame.

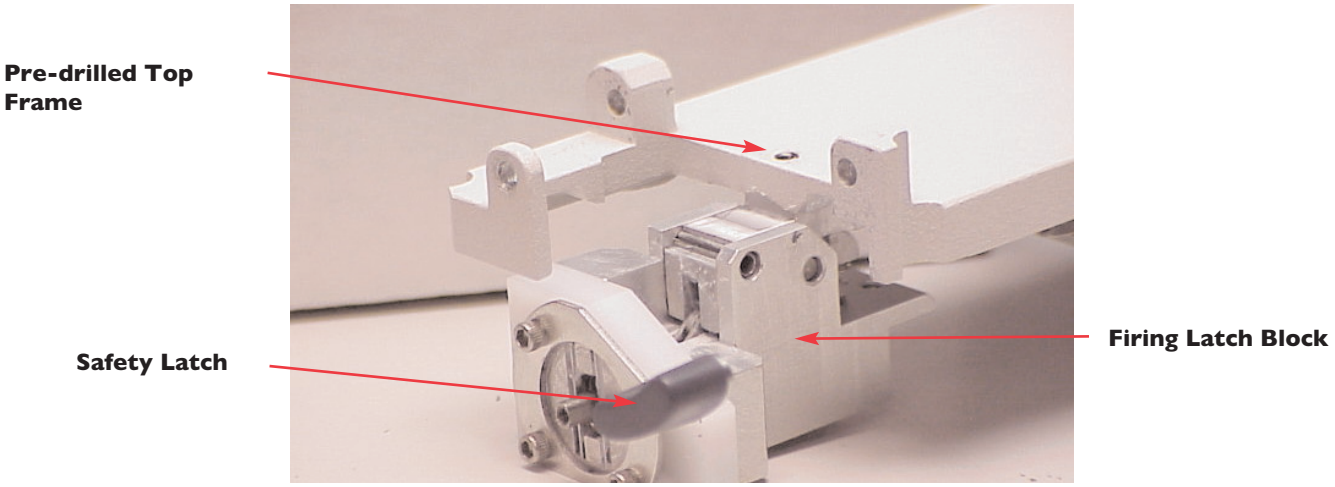

Figure 5-15. Assembling the Firing Latch Block and Safety Latch to the Top Frame

4 Place the positioning spring (p/n 3703.257) onto the top frame, with the spring tab directed toward the back end (cable and transmission end) of the top frame.

5 Secure the positioning spring using 4-40 fastener (p/n 700-001945). Torque to 8 in-lbs. +/- 1 in-lbs.

6 Remove the bracket subassembly (p/n CEA237-123S) from the transmission-mounting bracket.

7 Remove the manual spade from the transmission-mounting bracket and replace the manual spade with manual spade with coupling assembly (p/n CEA442-99), as shown in Figure 5-16. Installing the Manual Spade with Coupling Assembly.

8 Reassemble the ST Holster (see **Chapter 4**) using Rotation Knob (p/n 3703.263) (See Figure 5-17. New Rotation Knob), and top frame with pre-drilled hole (p/n TFSA200B).

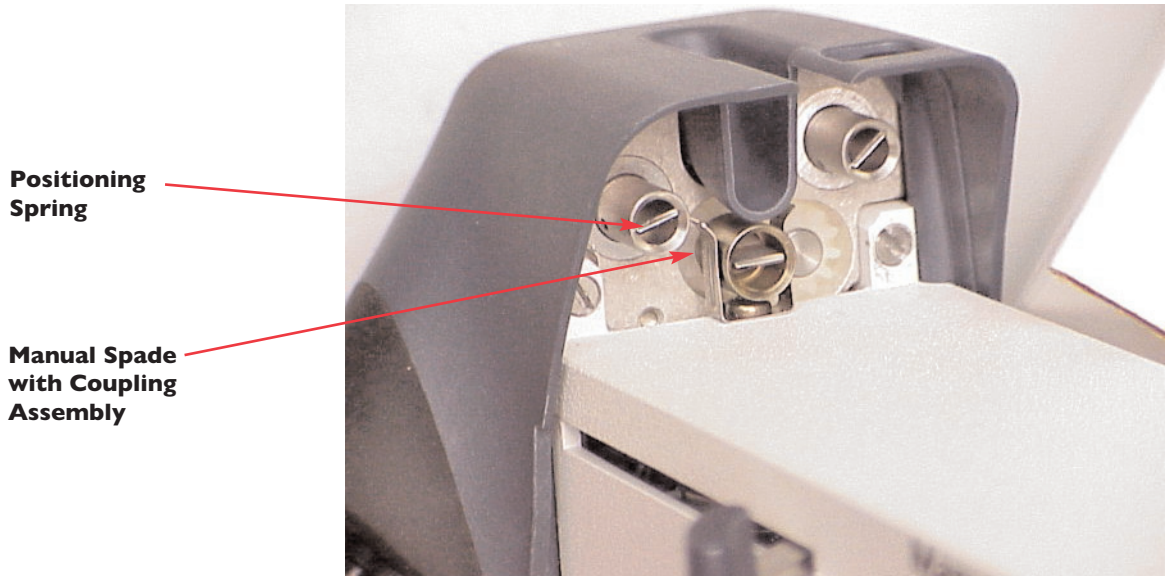

Figure 5-16. Installing the Manual Spade with Coupling Assembly

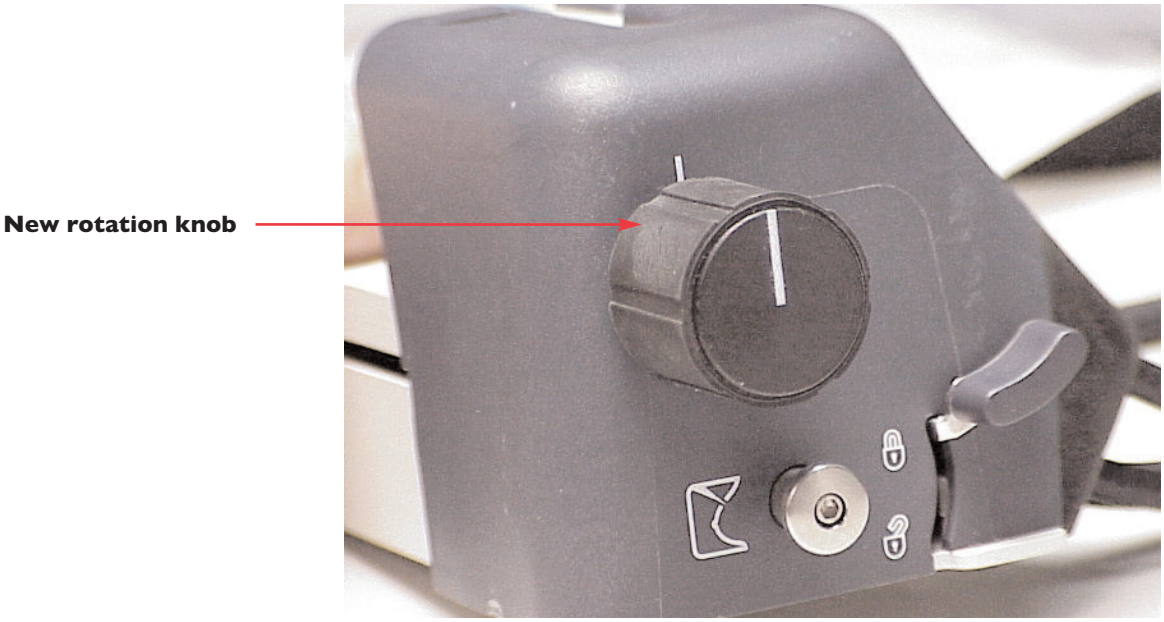

Figure 5-17. New Rotation Knob

Coil Pin Replacement

Materials/Equipment Required

Part Description	Old Part Number	New Part Number
Manual Spade Assembly	CEA442-99S	CEA665-31S
Coiled Pin	CLDP031X187MDPS	CLDP047X187MCP
Port Shaft	CEA237-707S	CEA663-85S
Spur Gear	A1N1-N32012-S	CEA664-85S
Bracket Sub-Assembly	CEA-237-123S	CEA666-31S

Inspection Criteria/Upgrade Identification

- All ST Holsters with serial numbers of GST042479 and lower will require inspection for the upgrade.
- Each unit that is upgraded (S/N GST042479 and lower) will have an X scribed into the Bracket Sub-Assembly above the left spade lug to enable a visual inspection for the presence of the upgrade.

Upgrade Procedure

1 Disassemble the ST Holster, completing the steps up to and including removal of the shroud and bottom frame described in **Chapter 4** of this manual.

2 Remove the e-clip that secures the existing spade assembly (p/n CEA442-99) to the bracket subassembly (p/n CEA237-123S)

3 Remove the existing spade assembly and replace it with manual spade assembly (p/n CEA665-31S), securing it in place with the e-clip and washer included with the assembly.

4 Place the port shaft in the Mammotome ST Holster Pin Assembly Fixture (installed in the Arbor Press), aligning the hole in the port shaft with the pin in the fixture

5 Position the coiled pin (p/n CLDP047X187MCP) on the top hole of the port shaft and lower the Arbor Press to secure the coiled pin in the machined hole of the port shaft.

6 On the blade side of the bracket subassembly, scribe an “X” above the left spade lug. This may be done with an engraving tool or a sharp object, as the metal is soft.

7 Reassemble the ST Holster using port shaft using new port shaft (p/n CEA663-85S), and new spur gear (p/n CEA664-85S)

Quality Assurance

Update Quality Assurance inspection criteria to include the inspection for the upgrade X above the left spade lug for all ST Holsters with a serial number of GST042479 and lower.

DC Motor Adapter Upgrade

This upgrade is being implemented to improve the reliability of the DC motor adapter, specifically when the translational and rotational motor assemblies are subjected to an impact force.

Inspection Criteria

This upgrade applies to SCM12 and SCM23 systems with serial numbers less than 1202403 and 2301080, respectively.

Material/Equipment Required

Part Description	Old Part Number	New Part Number
Compression Coupling	700-001526	15117
13mm Round Spacer	N/A	15118
DC Motor Adapter	3432.156	3432.372
Front Interface Bracket	3432.133	3432.371

Upgrade Procedure

1. Remove the front interface bracket.
2. Discard the following components:
   - Compression Coupling 700-001526
   - DC Motor Adapter 3432.156
   - Front Interface Bracket 3432.133
3. Acquire the new Front Interface Bracket (p/n 3432.371) and attach to the chassis.
4. Reassemble the VSO, the two motors and both solenoid assemblies onto the Front Interface Bracket.
5. Place washer (p/n 15118) over end of one of the motor assemblies (see Figure 5-18. Washer Assembled onto Motor).

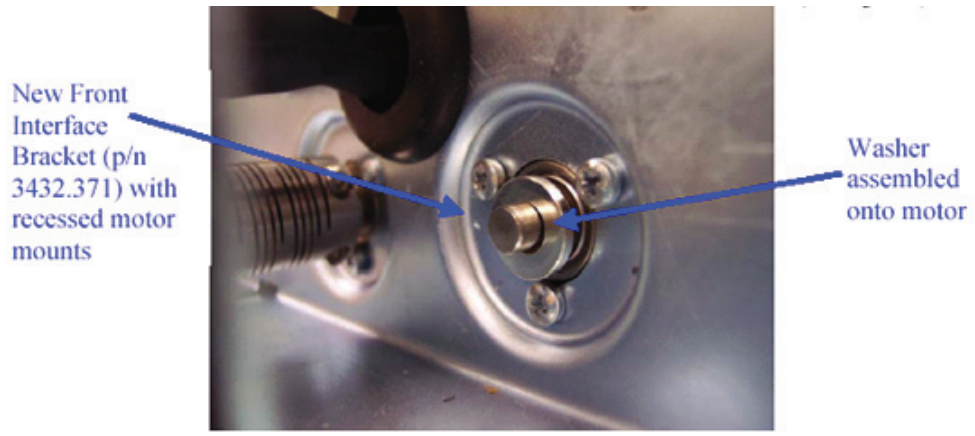

Figure 5-18. Washer Assembled onto Motor

6 Insert one compression coupling (p/n 15117) and the lemo connector nut onto the end of the motor and tighten the two screws to 3 in-lbs to secure the coupling to the motor (see Figure 5-19. Compression Coupling and DC Motor Adapter Attachment). The lemo connector nut must be inserted here to facilitate attachment of the lemo connector shell in the next step.

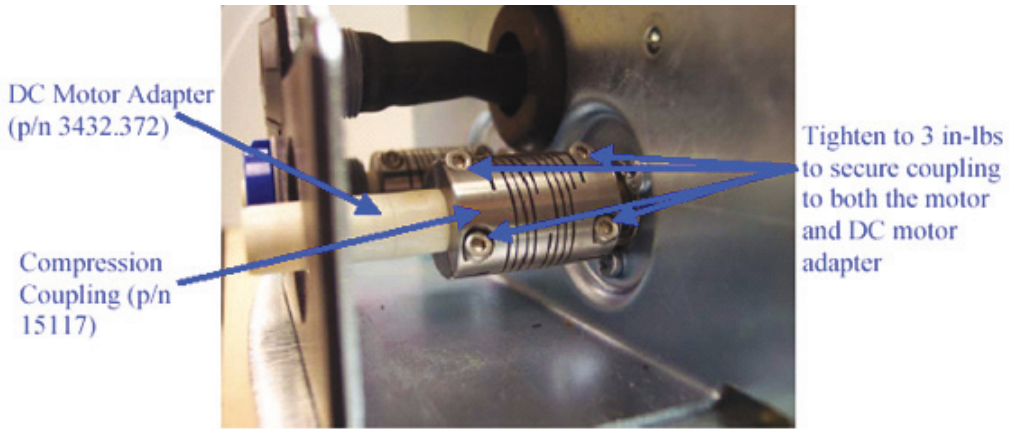
DC Motor Adapter (p/n 3432.372)
Compression Coupling (p/n 15117)
Tighten to 3 in-lbs to secure coupling to both the motor and DC motor adapter

Figure 5-19. Compression Coupling and DC Motor Adapter Attachment

7 Reassemble lemo connector shell and nut to the front interface bracket (see Figure 5-20. Complete DC Motor Adapter Assembly).

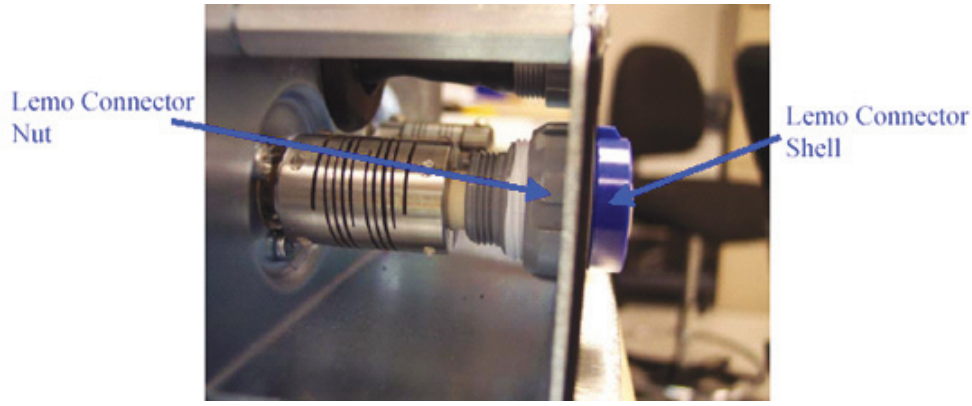

Figure 5-20. Complete DC Motor Adapter Assembly

8 Repeat steps 5 through 7 for the additional DC Motor Adapter assembly, if applicable.

9 Complete reassembly of control module.

Upgrading Regulatory Label on Control Modules SCM12 and SCM23

This upgrade obsoletes regulatory labels D06239P02.

Inspection Criteria

Any control module (SCM12 and SCM23) that has the heart symbol on the regulatory label must be upgraded by replacing that label with label D15611P02.

Material/Equipment Required

- Label D15611P02

Upgrade Procedure

1. Replace label D06239P02 with label D15611P02.

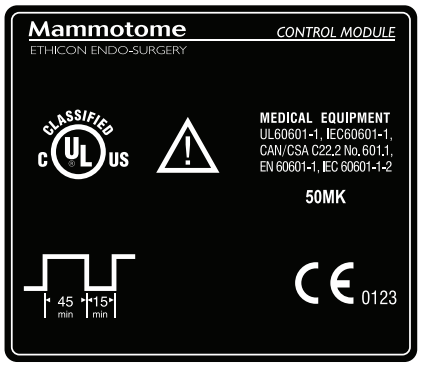

Figure 5-21. Correct Label D15611P02

Upgrading Control Modules SCM12 and SCM23 for EX Functionality

This upgrade addresses the procedure to upgrade Mammotome control modules for Mammotome EX functionality.

Inspection Criteria

- Customers requesting Mammotome EX functionality will receive this upgrade along with application software version 5.0.

Material/Equipment Required

Part Number	Description	Quantity
3432.401	Interface Board	1
3432.402	Interface Board Mounting Bracket	1
3432.406	PS to IF Board Wire Harness	1
3432.407	Uniboard to IF Board Wire Harness	1
92745A510	3/8" Hex male/female nylon standoff, 8-32 threads, 3/8" length	5
95000A192	8-32 X 5/16" PPHMS, nylon, Phillips head	5
28A0640-0A0	Ferrite Shield, Clip-on plastic shrouded	1
D15356	Mammotome EX Label	1

UpgradeProcedure

1 Remove the main housing from the control module.

2 Observe the orientation of the capacitor bracket (refer to Figure 5-22 for correct orientation). If the bracket is not oriented properly, remove the two fasteners securing the bracket, rotate the bracket and resecure the bracket.

3 Remove the front left lock nut, which secures the rubber feet to the base plate (lock nut closest to the capacitor bracket. (See Figure 5-22. Capacitor and Base Plate View)

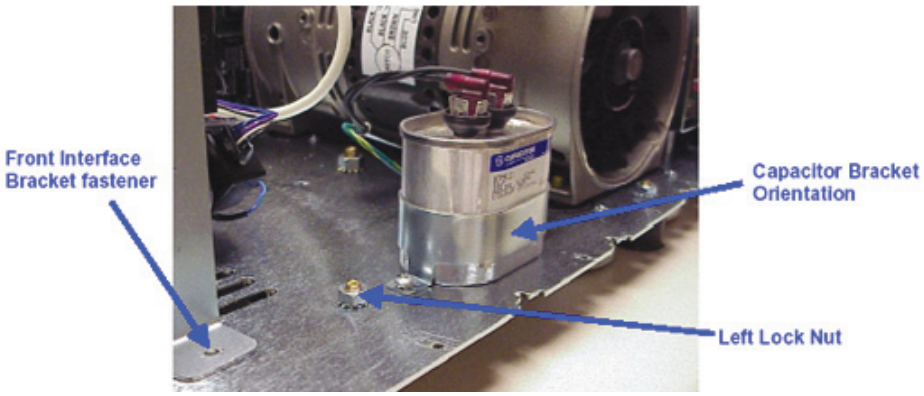

Figure 5-22. Capacitor and Base Plate View

4 Remove the fastener on the front interface bracket.

5 Disconnect holster interface harness from uniboard and remove tie strap securing motor wire harnesses to holster interface harness (See Figure 5-23 Holster Interface Harness Identification for identification of correct harness).

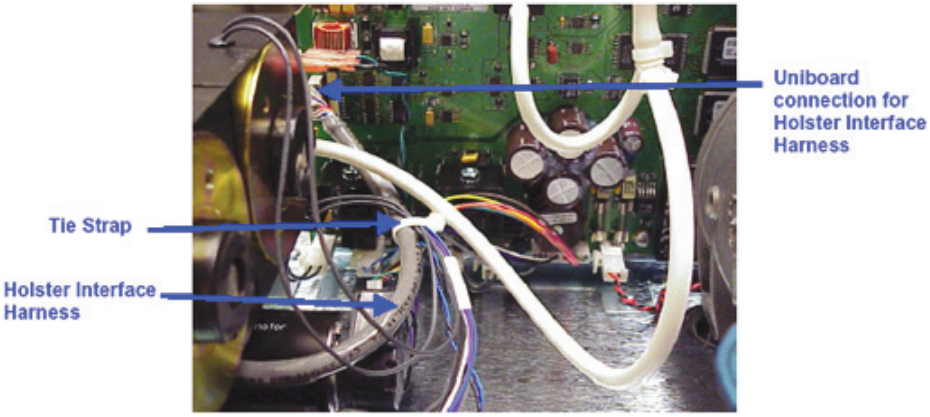

Figure 5-23. Holster Interface Harness Identification

6 Attach a ferrite bead (p/n 28A0640-0A0) to the end of the holster interface harness (See Figure 5-24. Ferrite Bead Location)

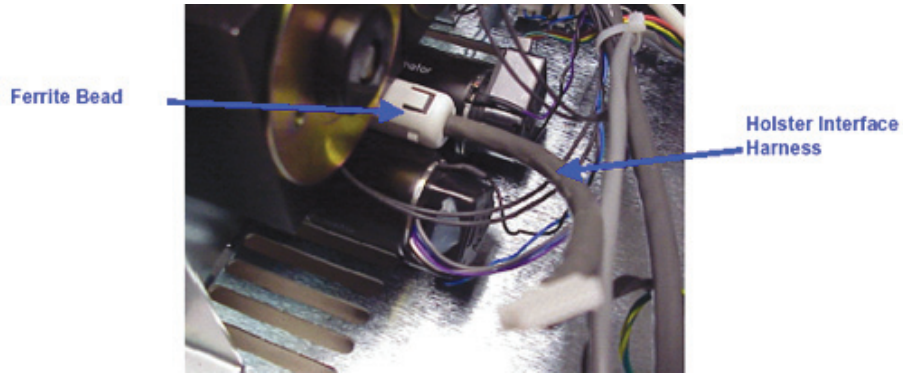

Figure 5-24. Ferrite Bead Location

7 Connect the uniboard interface harness (p/n 3432.407) to the uniboard and route over the top of the motor wire harness assemblies (See Figure 5-25. Harness Routing)

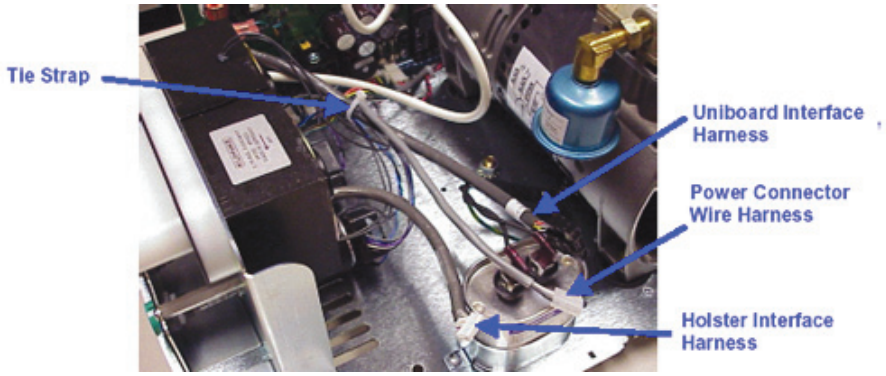

Figure 5-25. Harness Routing

8 Route the power connector wire harness (p/n 3432.406) over the top of the uniboard interface harness and secure the power connector wire harness, the uniboard interface harness, and the motor wiring harnesses with a tie strap.

9 Route the end of the power connector wire harness to the power supply DC terminals. Connect the black wire to terminal 3 and the white (or red) wire to terminal 8 (See Figure 5-26. Power Supply Connection)

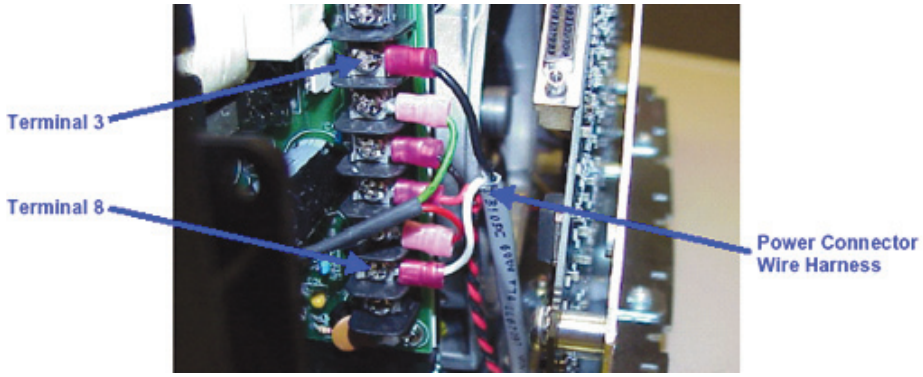

Figure 5-26. Power Supply Connection

10 Remove the tie strap securing the vacuum pump wire harness to the base plate (See Figure 5-27. Power Connector Wire Harness Routing).

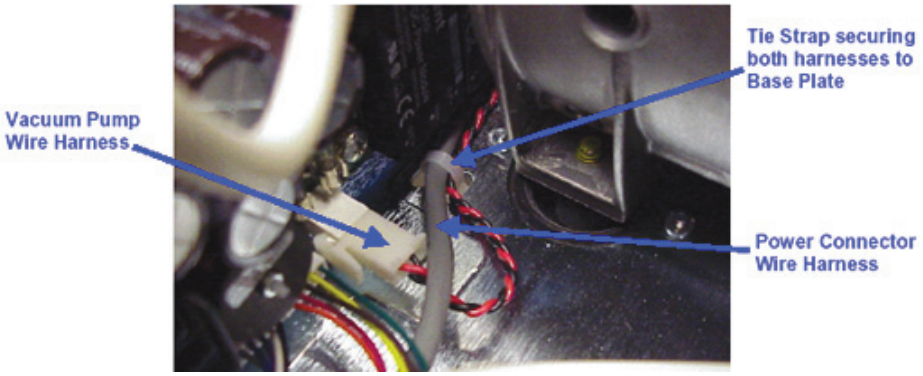

Figure 5-27. Power Connector Wire Harness Routing

11 Route the power connector wire harness along the base of the uniboard alongside the vacuum pump wire harness and secure both harnesses to the base plate with a tie strap.

12 Remove the second tie strap securing the vacuum pump wire harness to the base plate closest to the video board connection to the uniboard (See Figure 5-28. Power Connector Wire Harness Routing II).

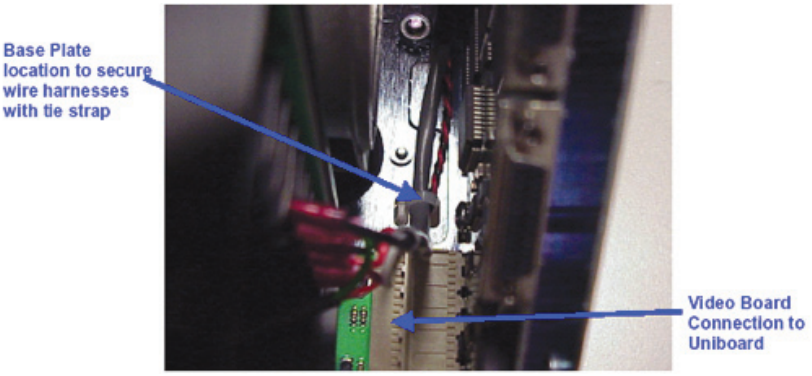

Figure 5-28. Power Connector Wire Harness Routing II

13 Route the power connector wire harness alongside the vacuum pump wire harness, and secure both harnesses to the base plate with a tie strap.

14 Using an ESD safe technique, remove the interface board from the packaging.

15 Place the interface board (p/n 3432.401) on the interface board mounting bracket and secure it with five (5) nylon standoffs (p/n 92745A510) and five (5) nylon fasteners (p/n 95000A192)

16 Place the Interface PCBA on the base plate, aligning bracket holes with corresponding mounting hole on the interface bracket and the rubber foot mountingscrew and secure using the previously removed hardware (See Figure 5-29. Interface Board Connections).

17 Connect the holster interface harness from the front interface bracket to the interface PCBA.

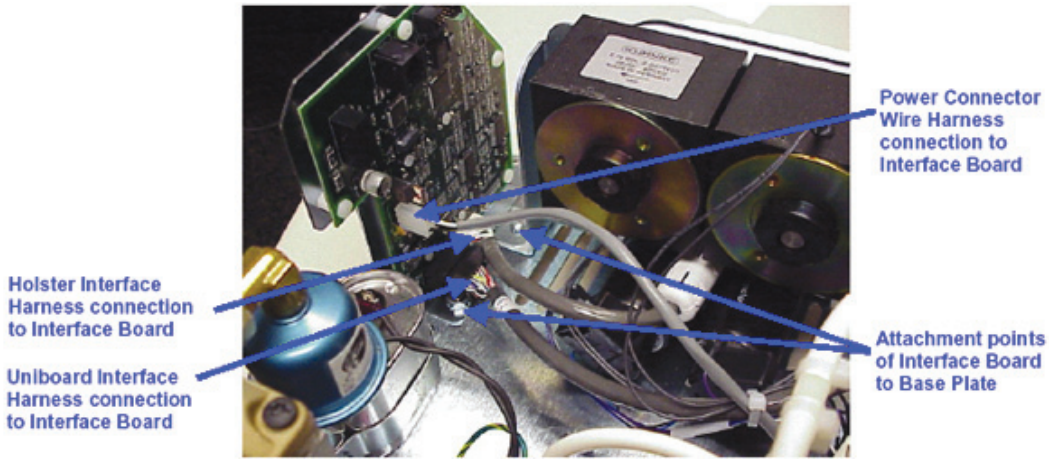
Power Connector Wire Harness connection to Interface Board
Holster Interface Harness connection to Interface Board
Uniboard Interface Harness connection to Interface Board
Attachment points of Interface Board to Base Plate

Figure 5-29. Interface Board Connections

18 Connect the uniboard interface harness to the interface PCBA.

19 Connect the power connector wire harness to the interface PCBA.

20 Record the serial number of the interface board in the service history record of the unit.

21 Reassemble the control module.

Mammotome EX Identification

- Affix the EX label to the lower left corner of the rear bracket (See Figure 5-30. Location of Mammotome EX Upgrade Label)

Figure 5-30. Location of Mammotome EX Upgrade Label

MR Cart Upgrade Kit

This upgrade addresses the procedure to upgrade Mammotome cart assemblies for Mammotome MR functionality.

Inspection Criteria

- Customers requesting Mammotome MR functionality will receive this upgrade.

Material/Equipment Required

Part Number	Description	Quantity
NA	Left Saddle Assembly	1
NA	Right Saddle Assembly	1
23561-052	EX Dual Docking Cup	1
04-05-020 (F)	ST Bracket	1
04-05-020 (E)	EX Mounting Bracket	1
02-01-001	Holster Saddle	1
04-05-020 (MI)	Tube Set Hanger	1
23570-109	Warning Label	2
23570-105	Parts Kit	1
16789-011	MR Docking Cup Bracket	1
23570-128	MR Docking Cup	1
25025-055	Fastener, 10-32 x 1/2 PFHMS SS	2
25021-021	Fastener, 4-40 x .375 BSHCS	2
25025-052	Fastener, 10-32 x 1/2 BSHCS SS	2
23153-001	1/16" Hex Shortarm	1
22006-003	1/8" Hex Shortarm	1
23154-001	1/8" Hex Combo Box & Open	1

Assembly Instructions

1. Open the SCMC1 cart door and turn the locking knobs to the left to disengage the cart from the control module (See Figure 5-31. Disengaging the SCMC1 Cart from the Control Module).

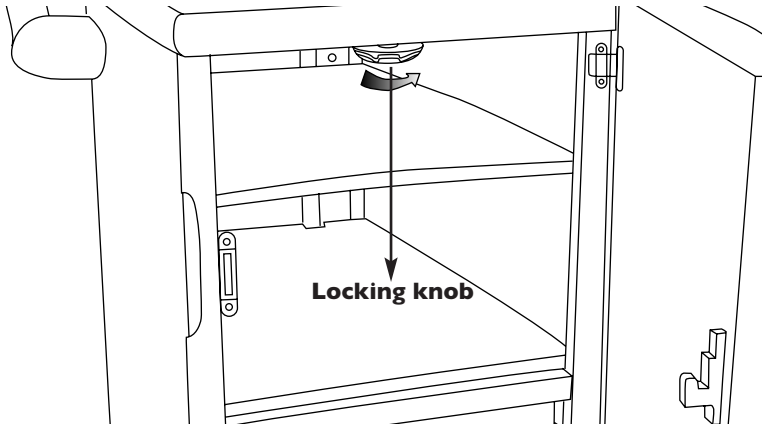

Figure 5-31. Disengaging the SCMC1 Cart from the Control Module

2 Remove the control module from the cart.

3 Assemble the right and left saddle assemblies using the tongue-in-groove.

4 Slide the saddle assemblies onto the cart, aligning the holes on the saddle assembly with the holes on the cart top (See Figure 5-32. Placing the Saddle Assemblies on the Cart).

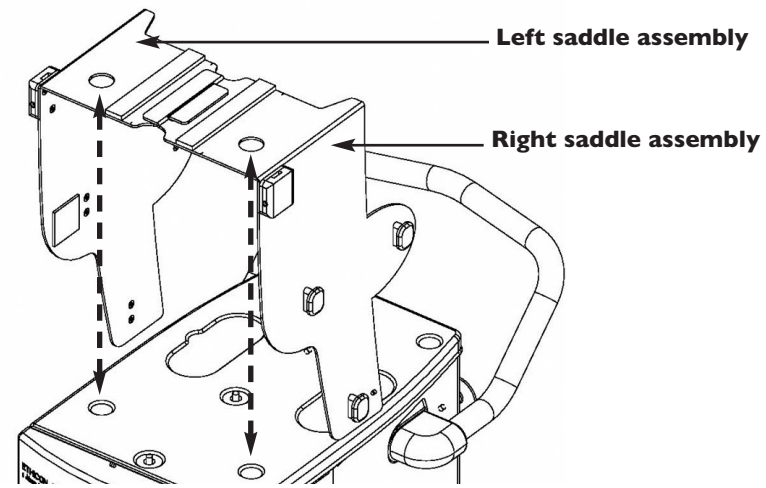

Figure 5-32. Placing the Saddle Assemblies on the Cart

5 Place the control module on the cart, and turn the locking knobs to the right to re-engage the control module to the cart.

6 Assemble the brackets and docking cups for each platform configuration (See Figure 5-33. EX/HH Bracket and Docking Cup Assembly; Figure 5-34. MR Bracket and Docking Cup Assembly; Figure 5-35. ST Bracket Assembly).

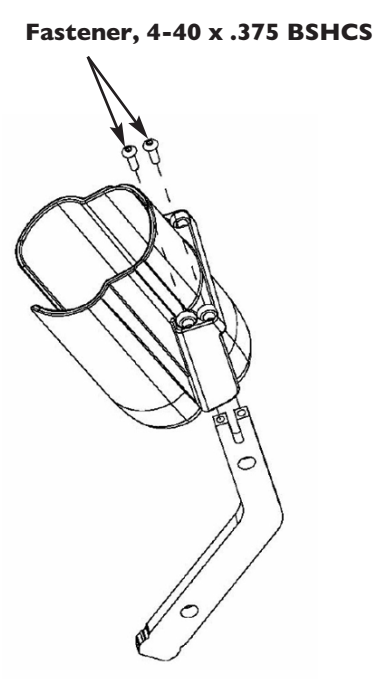

Figure 5-33. EX/HH Bracket and Docking Cup Assembly

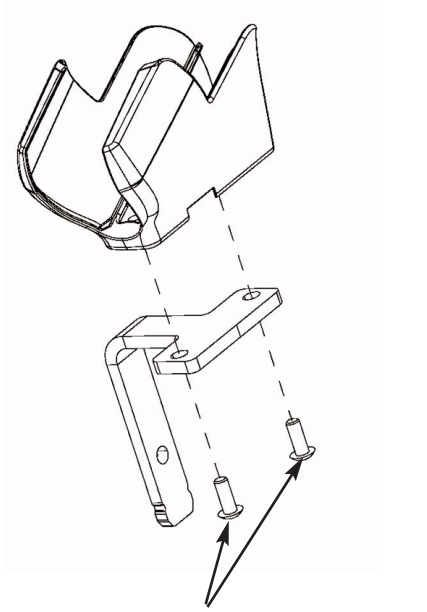

Figure 5-34. MR Bracket and Docking Cup Assembly

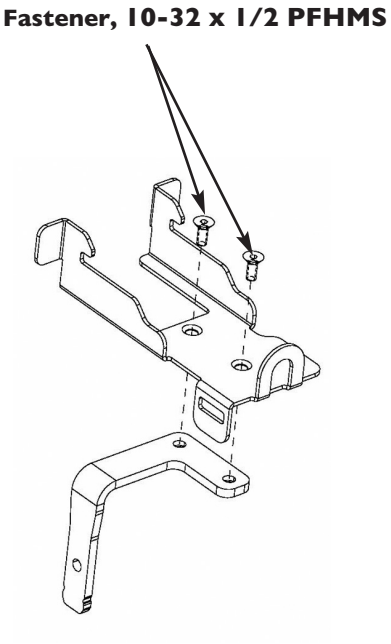

Figure 5-35. ST Bracket Assembly

7 Assemble the docking cups and brackets using the appropriate fasteners, ensuring that the brackets and docking cups are oriented for the intended saddle assembly mounting block location (See Figures 5-33, 5-34, and 5-35). Bracket and docking cup assemblies are installed in the mounting blocks located on the left and right saddle assemblies (See Figure 5-36. Installing the Bracket and Docking Cup Assemblies).

Note: There are only two (2) saddle assembly mounting blocks. Install the MR bracket and docking cup assembly in one mounting block; install the EX/HH or ST docking cup and bracket assemblies in the other mounting block. Store the remaining docking cup and bracket assembly for future use.

8 Mount the tube set hanger to the top of the cart door.

9 Mount the two (2) MR Unsafe labels: one on the front of the control module, and one on the front of the cart (See Figure 5-36 and Figure 5-37. for MR Unsafe label placement locations).

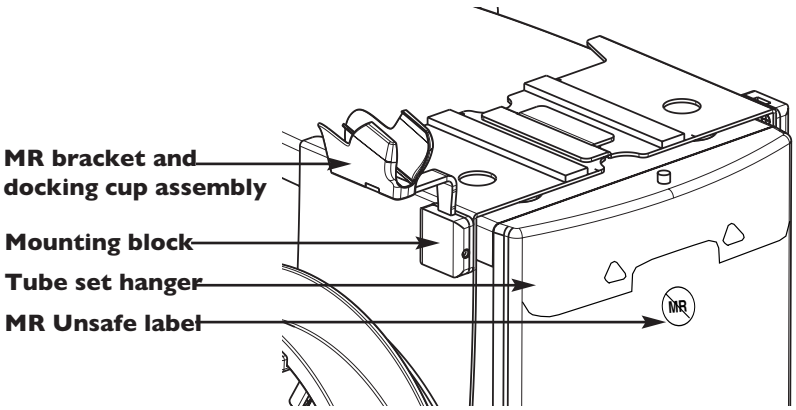

Figure 5-36. Installing the Bracket and Docking Cup Assemblies

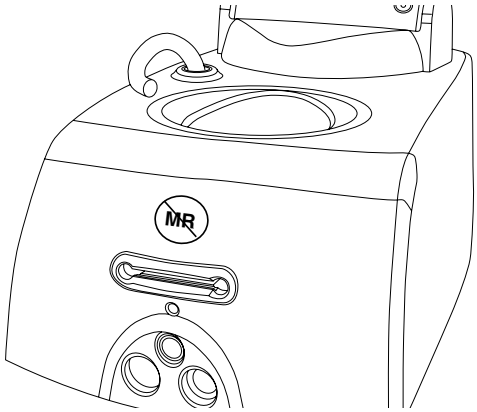

Figure 5-37. MR Unsafe label Placement Location on Control Module

Introduction

Electrical safety testing is required whenever the ground is disconnected from the MAMMOTOME System and/or an electrical/mechanical component is removed or replaced.

Required Equipment

- Dielectric Strength Tester
- Continuity Tester

Electrical Safety Tests

Mains to Earth Ground Test Procedure

1. Connect the High Voltage port of the tester to the mains of the unit under test.
2. Connect the Return port of the tester to the ground lug of the unit under test.
3. Set the tester to 1200AC volts (1834 VAC for SCM23) for one second with a one-second ramp.
4. The current limit should be set to 10mA (15mA for SCM23).
5. Update **Figure 6-1. Electrical Safety Test Results**, with test results.

Mains to Patient Test Procedure

1. Leave the High Voltage port of the tester connected to the mains of the unit under test.
2. Connect the Return port of the tester to all pins of the holster electrical connector.
3. Set the tester to 3000AC volts for one second with a one-second ramp.
4. The current limit should be set for 20mA.
5. Update **Figure 6-1. Electrical Safety Test Results,** with test results.

Ground Continuity Test

1. Connect the unit under test to the electrical receptacle of the tester.
2. Connect the continuity port of the tester to the ground lug of the unit under test.
3. Set the tester to a limit of 30A and 0.1 Ω.
4. Update **Figure 6-1. Electrical Safety Test Results,** with test results.

Figure 6-1. Electrical Safety Test Results

Procedure	Test Specification	Tested Value	Pass/Fail
Mains to Earth Ground Test	< 10mA		
Mains to Patient Test	< 20mA		
Ground Continuity Test	< 0.1 Ω		

Tested By (Print name): _____

Signature: _____ Date: _____

Ethicon Endo-Surgery, Inc. warrants this product to be free from defects in material and workmanship under normal use and preventive maintenance for the respective warranty period shown below. Ethicon Endo-Surgery Inc.'s obligation under this warranty is limited to the repair or replacement, at its option, of any product, or part thereof, which has been returned to Ethicon Endo-Surgery, Inc. or its Distributor within the applicable time period shown below and which examination disclosed, to Ethicon Endo-Surgery, Inc.'s satisfaction, to be defective. This warranty does not apply to any product, or part thereof, that has been: (1) adversely affected due to use with devices manufactured or distributed by parties not authorized by Ethicon Endo-Surgery, Inc. (2) repaired or altered outside Ethicon Endo-Surgery, Inc.'s factory in a way so as to, in Ethicon Endo-Surgery, Inc.'s judgement, affect its stability or reliability, (3) subjected to improper use, negligence or accident, or (4) used other than in accordance with the design and use parameters, instructions and guidelines for the product or with functional, operational or environmental standards for similar products generally accepted in the industry.

Ethicon Endo-Surgery, Inc.'s products are warranted for the following periods after delivery to the original purchaser:

ST Holster One (1) Year, Parts and Labor
HH Holster One (1) Year, Parts and Labor
EX Holster One (1) Year, Parts and Labor
MR Holster One (1) Year, Parts and Labor
MR Interlock System One (1) Year, Parts and Labor
Control Module One (1) Year, Parts and Labor
Footswitch One (1) Year, Parts and Labor
Support Arm One (1) Year, Parts and Labor
Cart and Cart Upgrade Kit One (1) Year, Parts and Labor
Software Package One (1) Year, Parts and Labor
Remote Keypad One (1) Year, Parts and Labor

UNLESS SUPERCEDED BY APPLICABLE LOCAL LAW, THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING THE WARRANTIES ***OF*** MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, AND OF ALL OTHER OBLIGATIONS OR LIABILITIES ON THE PART OF ETHICON ENDO-SURGERY, INC. AND IS A PURCHASER'S EXCLUSIVE REMEDY. IN NO EVENT SHALL ETHICON ENDO-SURGERY, INC. BE LIABLE FOR SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES INCLUDING, WITHOUT LIMITATION, DAMAGES RESULTING FROM LOSS OF USE, PROFITS, BUSINESS OR GOODWILL OTHER THAN AS EXPRESSLY PROVIDED BY A SPECIFIC LAW. Ethicon Endo-Surgery, Inc. neither assumes nor authorizes any other person to assume for it any other liability in connection with the sale or use of any of Ethicon Endo-Surgery, Inc. products. There are no warranties that extend beyond the terms hereof.

Ethicon Endo-Surgery, Inc. reserves the right to make changes to products built and/or sold by them at any time without incurring any obligation to make the same or similar changes on products previously built and/or sold by them.

Caution: Federal (USA) law restricts this device to sale by or on the order of a physician.

P43538P04

REF

SCM12	HH11BEX	MUPG4
SCM23	HH8BEX	
HHHC1	MHH11	
STHC1	MHH11B	
HHEX	MHH14	
SCMH1	MHH8	
SCMH2	MST11	
SCMH3	MST11B	
SCMS1	MST14	
SCMS2	MST8	
SCMA1	MRH1	
SCMSW4	MRLB1	
SCMSW5	SCMSW6	
MFSW1	SCMC1	
MKEY1	SCMC3	

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